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WILDLIFE IN NORTH CAROLINA

JANUARY 1993 $1.50

BIENNIAL REPORT

JULY 1, 1990 - JUNE 30, 1992

North Carolina Wildlife Resources Commission

512 N. Salisbury Street, Raleigh, North Carolina 27604-1188

His Excellency, The Governor of North Carolina
Members of the General Assembly
Raleigh, North Carolina

Dear Sirs:

I am pleased to present to you the 23rd Biennial Report of the North Carolina Wildlife Resources Commission. This report reflects the Commission's activities and accomplishments for the period beginning July 1, 1990, and ending June 30, 1992.

As chairman of the North Carolina Wildlife Resources Commission, I am pleased to report that during the biennium, the Wildlife Endowment Fund principal grew by $6.7 million to reach a total of over $22.5 million. This Fund is supported entirely through the sales of lifetime licenses, lifetime magazine subscriptions and contributions, and the interest is providing support for many vital programs.

The biennium saw several significant changes including the passage of legislation making hunter-safety instruction mandatory for those purchasing a first-time hunting license, and also establishing the mandatory use of blaze orange when hunting small game. Hunting is statistically a very safe sport, and these laws are making it even safer.

During the biennium, the white-tailed deer population reached a record high of 700,000, and populations of black bear also increased. Wild turkeys continued their impressive comeback from a remnant population 20 years ago, now numbering an estimated 35,000. Special emphasis was placed on research and management to aid small-game populations, particularly through cooperative efforts to improve habitat on both public and private lands. Extensive fishery management continued to provide increased sport for anglers, and the capability for even greater improvements was enhanced by the acquisition of the Watha hatchery. With the aid of donations generated by the income tax checkoff, the Wildlife Commission continued to play a lead role in the survey, protection and management of the state's nongame, threatened or endangered wildlife. Our educational programs saw further expansion in the schools through a growing network of workshops for teachers.

Our achievements during this biennial period would not have been possible without your support, and the support of the legislature, sportsmen and concerned citizens. We sincerely express our appreciation, and we pledge our continued efforts to ensure a sound future for our wildlife resources and the habitat we share with them.

Respectfully yours,

Richard P. Budd

Richard P. Budd, Chairman

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BI93

January, 1993
Volume 57, Number 1

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and also to the environment we share with them.

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Cover *Lazy bobcat stretches out in a bed of leaves. Photograph by Jack Dermid.*

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PROTECTING THE RESOURCE

Regulating fishing, hunting and trapping, and managing the wildlife resources of North Carolina are the responsibilities of the N.C. Wildlife Resources Commission.

Chairman Richard P. Budd of Winston-Salem heads the commission while Eugene Price of Goldsboro is vice chairman. Other commissioners are Susan L. Allen of Cary, Ferrell L. Blount III of Bethel, Ovide E. de St. Aubin of Siler City, William H. Drummond of High Point, Robert C. Hayes of Concord, Russell M. Hull Jr. of Elizabeth City, Ted B. Lockerman of Clinton, Dr. William H. McCall of Asheville, Joseph A. Neisler Jr. of Lake Waccamaw, John W. Parks III of Gastonia and Roy Gerodd Sowers III of Burgaw.

Charles Fullwood is executive director of the 492-employee agency that was established in 1947. Employees work in such fields as education, wildlife and fish management, law enforcement and administration.

The Commission wound up the biennium in sound financial condition with a cash balance in the Wildlife Resources Fund of $3,839,318 on June 30, 1992. The Wildlife Endowment Fund had a balance of $22,547,221 on June 30, 1992, of which $4,111,930 was expendable interest. As chairman, Budd appointed a finance committee to study the future needs of the Commission. A report to the 1993 General Assembly is required and will address future and adequate funding of fish and wildlife programs.

Legislation that had an immediate impact was passed and signed into law in the 1991 session of the General Assembly. That law made mandatory the use of a blaze-orange cap or outer garment in the hunting of small game. Warning citations were issued by enforcement officers during the 1991-92 hunting season. After July 1, 1992, officers began issuing citations for violating this requirement.

There were many success stories in wildlife and fisheries management during the past two years. The wild turkey harvest, for example, showed an increase for the ninth straight year. Bearded birds only are harvested during the annual spring season. Restoration programs are continuing and much success is being seen in the mountain country of the state.

The deer population continues to increase. The annual harvest was in excess of 100,000 for each season of the biennium.

Fisheries employees of the Wildlife Commission are now operating the recently acquired Watha hatchery in southeastern North Carolina. Warmwater species will be hatched and raised out at this facility which was purchased at a cost of $1.2 million in the first year of the biennium. Some fish will be transported from Watha to the Fayetteville hatchery for further growth before being stocked in lakes and reservoirs throughout the state.

The Wildlife Commission's education programs in safe hunting and boating are paying dividends. Fatalities decreased in both areas during 1991-92. Education of sportsmen through hunter-education courses and expansion of the mandatory use of blaze orange by hunters were factors in the decline of hunting accidents and fatalities.

Several Wildlife Commission educational programs are specifically designed for benefit of youngsters. Project WILD is a popular environ-mental-education program for teachers. It is designed to inform teachers on methods of teaching environmental and conservation subjects to students. The CATCH (Carolina Anglers Teach Children How) program has provided instruction in fishing and boating safety while providing an enjoyable outdoors experience to youngsters throughout the state. Several dove and deer hunts are sponsored by the Wildlife Commission for youngsters each year.

The Enforcement Division came up with a unique idea in locating and apprehending deer poachers. Use of a foam deer was authorized and through cooperation of land owners, these "dummy" deer have been used by officers in many sections of the state in an effort to reduce illegal shooting of deer at night.

In May 1992, Col. Bobby Tatum was named to head the Enforcement Division. Col. Tatum replaced Jerry Rich who retired.

The Wildlife Commission joined hands with the N.C. Sportsman's Alliance during the period to form the Wildlife Watch program. Rewards will be paid to citizens who report serious violations of North Carolina game and fish laws. Rewards will be paid only upon conviction of those involved. The Wildlife Commission Enforcement Division will take telephone calls through its toll-free number and the Sportsman's Alliance will administer the program. The Commission contributed $5,000 to the Alliance to start the program.

Much progress was made during the past biennium, and the Wildlife Commission will continue to work with the sportsmen and conservationists of North Carolina to improve the welfare of wildlife, wildlife habitat and also the quality of hunting and fishing experiences for Tar Heel citizens.

A critical part *of the Wildlife Commission's work is presenting new hunting, fishing and trapping regulations for comments at public hearings around the state. Here, Assistant Director Dick Hamilton addresses a public hearing along with a contingent of biologists and wildlife enforcement officers.*

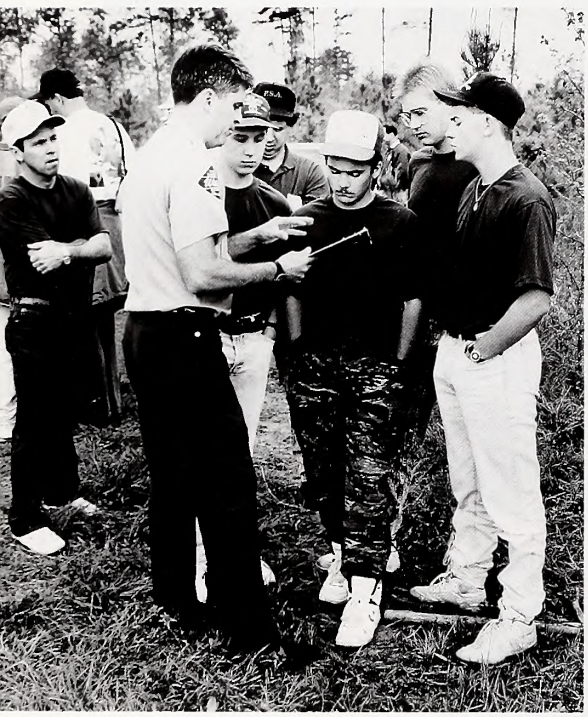
KEN TAYLOR

MELISSA McGAW

Executive Director Charles Fullwood *leads the N.C. Wildlife Resources Commission. This agency consists of 492 employees in fields as diverse as biology, forestry, enforcement, financial management and education.*

ENFORCEMENT

Under the agency's Five-Point Plan for improving the Division of Enforcement, all supervisors received extensive training during the biennium. In addition to supervisory training, officers completed training programs in performance management, pressure-point defensive tactics, pursuit driving, first responder, hazardous materials and blood-borne pathogen awareness.



KEN TAYLOR

Wildlife enforcement officer *Mark Bruton talks to a group of youngsters at a hunter-safety tournament. Hunter-safety education is one of the top priorities of the Enforcement Division. The hunter-safety education program has been recognized as among the top 10 in the country.*

The Professional Development Council, established under the Five-Point Plan to improve communications from the field officer to the director's office, is bringing concerns and suggestions to those responsible for programs. The council consists of 11 members—one elected by each of the nine districts and the current and past Wildlife Officer of the Year. The council meets quarterly to discuss a wide range of topics and to make recommendations to improve division operations and officer safety.

The council has facilitated a two-way flow of information. It has improved the way that ideas and suggestions are conveyed from field officers to their supervisors and administrators. It also has provided field officers with an insight into budgetary problems, administrative hurdles and other considerations that division and agency administrators face. Council members are encouraged to inform field officers and supervisors of topics discussed and of the status of council projects.

During this biennium, the Division of Enforcement has made steady improvement in its communications system. Radio repeater towers have been raised or relocated, antennas redirected, and new equipment purchased. In most cases, a wildlife enforcement officer can use the hand-held Motorola Saber radio and be in radio contact with officers in his district or in direct contact with our communications center in Raleigh. The communications center is manned 24 hours a day and provides immediate access to criminal records checks, past wildlife violations and warnings, vehicle and boat registrations and other information. If assistance or backup is needed, the communications center can direct our wildlife enforcement officers to the area and can marshal the resources of other law enforcement officers in the area.

The communications center is now located in the State Bureau of Investigation complex in Garner. This move provides much needed working space to the telecommunicators and to the Raleigh office staff. The communications section has employed two part-time telecommunicators who will be called in to work on an hourly basis when staff telecommunicators are unable to work due to sickness, vacation or position vacancies.

PROGRAMS

Wildlife enforcement officers spent 93,645 hours on hunting patrol in North Carolina during the 1991-92 season. During this time, officers checked 50,479 big-game hunters and 25,749 small-game hunters and issued 6,277 citations and 946 warnings. Night patrols produced the highest number of major wildlife violations. Officers clocked 32,494 hours of night deer patrol that resulted in 698 arrests.

The 1991 session of the N.C. General Assembly gave wildlife enforcement officers full arrest authority. This authority is critical because of the increased encounters with major drug possession violations during routine checks for compliance with game, fish and boating laws. With full authority established for wildlife officers, our personnel have been instrumental in non-wildlife related cases involving breaking and entering, drug trafficking and murder. Wildlife officers in North Carolina are viewed as professional law enforcement officers able to respond when called upon or needed. However, their interests and concerns continue to be those that attracted them to a fish and wildlife agency.

The agency's deer decoy program continues to play an important role in apprehending violators. Some of our wildlife enforcement officers began toying with the decoys to make them appear more life-like. Deer hides were used to cover the decoys and radio-control units were adapted so that a tail would flip or an ear or head would turn. These "moveable" decoys had great success. The problem was that there were too few of these moveable decoys available. Not all officers had the funds to make the conversions. And because the decoys looked so life-like, they drew a lot of fire and required considerable maintenance and repair time.

Using court-ordered funds received during the

STEVEN A. WILSON

***Joe Fowler** (left) checks an angler's fishing license. A wildlife officer's main job continues to be the enforcement of state and federal hunting, fishing and trapping laws.*

ENFORCEMENT

KEN TAYLOR

***New fiberglass patrol boats** will enable wildlife enforcement officers to do their jobs better. These state-of-the-art crafts have been modified to stand up to the rigors of law enforcement work.*

ENFORCEMENT SYNOPSIS—1991

Activity	Checked	Arrested	Warned
Hunters	76,510	5,490	465
Trappers	68	31	3
Fishermen	156,794	8,274	2,870
Boaters	105,531	6,581	10,782
Other	*	308	*
TOTAL	**338,903**	**20,684**	**14,120**

*No statistics available

ENFORCEMENT SYNOPSIS—1992

Activity	Checked	Arrested	Warned
Hunters	76,228	6,277	946
Trappers	229	79	16
Fishermen	152,279	7,974	3,454
Boaters	94,475	4,900	10,480
Other	*	459	*
TOTAL	**323,211**	**19,689**	**14,896**

*No statistics available

past year, the division was able to purchase enough decoys, radio-control units, supplies and materials to provide each of our 36 patrol areas with a moveable decoy. Sgt. Tony Robinson and Master Officer Lemar Worley led a training workshop in July 1992 where officers from each of the nine districts received instruction on how to construct the decoys. Sgt. Robinson also provided the officers with a step-by-step VHS video tape that they can use for reference.

During the biennium, the agency acquired a Maul aircraft with state-of-the-art instrumentation for use in enforcement patrols.

All wildlife enforcement officers have been issued ASP expandable batons and have received training in the tactical use of the baton. Officers feel that this item fills a gap in their ability to defend themselves and serves as a deterrent to assaults.

BOATING LAW ENFORCEMENT

Administration of the Recreational Boating Safety

Financial Assistance Program was shifted to the Division of Enforcement during the past year. Boating equipment needs for our wildlife enforcement officers have received more consideration. During the past year, new fiberglass patrol boats and a number of shallow-draft aluminum boats have been purchased with the federal funds.

The fiberglass boats have been modified to better suit enforcement needs. These boats are now equipped with: Bostrum suspension seats for both officers; switched all-weather sirens and adapters for blue lights; bows free of rails, running lights and cleats so that officers can more easily get off and board the boat to check bank fishermen; additional dry storage compartments; Bimini tops; radio holders mounted in front of the operator on specially constructed heavy-duty windshields so that officers can better monitor radio traffic while underway; full instrumentation to monitor engine performance better; and 60-gallon, built-in fuel tanks. Keels, chines and transoms have been beefed up with additional layers of fiberglass to withstand the rigors a patrol boat must face.

Boating enforcement patrols and education efforts are paying off in North Carolina. Recreational boating fatalities dropped to 26 during 1991. This is the lowest number of boating deaths ever recorded in this state.

Alcohol use while boating continues to be a major contributing factor in fatal boating accidents. Our studies indicate that in those fatal boating accidents where alcohol use was present, 42 percent of those people had one or more prior convictions for operating a motor vehicle while under the influence of alcohol.

In an attempt to get impaired operators off the water before they harm themselves or others, our officers have received additional training in identifying and in testing impaired boaters. Wildlife enforcement officers have coordinated efforts in this area with law enforcement officers from other agencies such as Alcohol Law Enforcement, local sheriff and police departments and the State Highway Patrol. Arrests for operating a boat while impaired have increased.

HUNTER EDUCATION

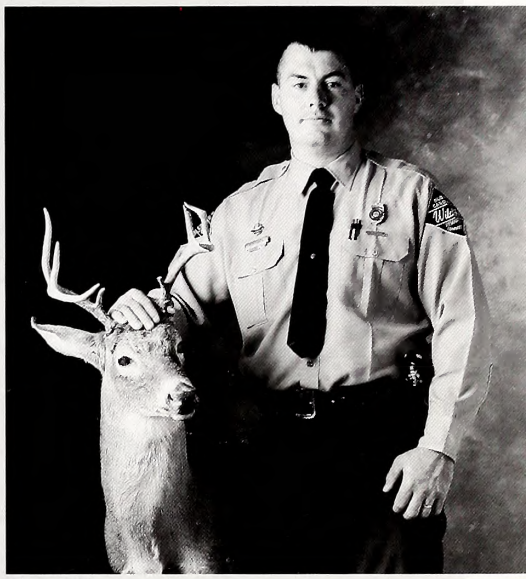
Hunter-safety education is another high-priority program in North Carolina. After completing our first year of mandatory hunter education, we are satisfied not only with the efforts of our officers and volunteer hunter-education instructors, but also with the results of the program.

At the conclusion of this first year, 1,724 volunteers are now certified hunter-education instructors. These volunteer instructors have been the backbone of our hunter-education program. They certified 28,204 students during the year—almost 8,000 students more than the previous year.

This training is having a positive effect as there were fewer deaths resulting from hunting accidents than ever reported in North Carolina. Out of 354,000 licensed hunters, records indicate that there were only five hunting deaths reported for the 1991-92 hunting season. Considering that there were two to three times that number annually during the 1960s and 1970s, this is quite an accomplishment. We take pride in this and in being recognized by the National Rifle Association as having one of the top 10 hunter-education programs in the United States and Canada during 1991.

The 21st century is approaching with all the problems and tough decisions that will have to be made concerning the environment and wildlife. While we and other fish and wildlife agencies face challenges and tough financial times ahead, we are fortunate that in North Carolina we are facing them with a cadre of well-trained, dedicated officers who have won the respect and support of the public through full, fair and impartial enforcement of the law. ☒

Frank Couch
Wildlife Enforcement Officer



MELISSA McGAW

The hunting season is the the most demanding time of the year, and it's the biggest challenge to me. My main objective is the apprehension of violators. The deer decoy has been a very effective enforcement tool.

In most counties of the state, hunting from the road or from a vehicle is unlawful. We get folks who do nothing but ride the roads early in the morning and late in the evening just to shoot deer as they come out and graze. That's where that decoy has been so effective. We can set it up anytime and anywhere. We don't have to wait for a live deer to come out.

When I've talked to other sportsmen and civilians, they've advised me that the amount of road-hunting activity in the county as a result of these decoys has just drastically been reduced. The number of violation calls I receive has also been cut down.

WILDLIFE MANAGEMENT

Providing leadership and advice concerning wildlife management to private landowners across the state is one of the primary responsibilities of the Division of Wildlife Management. This division is responsible for directly managing approximately 1.7 million acres of game lands as well as. In recent years, the importance of monitoring the status of an expanding number of wildlife species has increased as public interest in non-game and endangered species has risen and traditional uses of game species have been challenged. These new emphases have made it necessary for the division to expand its activities in such areas as routine surveys, banding and other research.

BIG GAME

The white-tailed deer continues to be the most popular game animal among North Carolina sportsmen. During the biennium, more hunter days were spent in pursuit of deer than any other species. Our statewide population approximates 700,000 animals, with herds well-distributed throughout the state. The mounting harvest of doe deer accompanied by efforts to relax harvest pressure on antlered bucks have been important factors in improving the sex ratios and increasing the percentage of older bucks in the observed harvest.

The state's wild turkey program made significant progress during the biennium. The wild turkey population is now estimated at 30,000 to 35,000 birds, occupying at least 87 of the state's 100 counties. Biologists relocated 821 wild turkeys to 53 different restoration sites across the state.

Black bear populations in coastal and mountain regions of the state continue to do well. Bears have expanded their ranges in both areas. Over the last 10 years, bear numbers have increased slightly in the mountains and have increased moderately on the coast.

Wild boar are found in portions of 10 mountain counties. During the biennium, hunters reported harvesting 202 wild boar to cooperator agents. Nearly 70 percent of the harvest occurred in Cherokee and Graham counties.

***Wildlife forester** David Allen (left) and an assistant assist in the release of a wild turkey. The wild turkey restoration program is making important strides with turkeys now occupying 87 of the state's 100 counties.*

CURTIS WOOTEN

SMALL GAME

To increase small-game populations, the Division of Wildlife Management continues to direct its efforts toward management practices with the potential for broad application. Underway are initiatives to improve small-game habitat on the state's 4 million acres of cropland, 1 million acres of pastureland and 14 million acres of privately owned woodlands.

Cooperative ventures with the N.C. Cooperative Extension Service, N.C. State University and the N.C. Department of Agriculture have resulted in the publication of pesticides and wildlife fact sheets for eight of our primary farm crops. These sheets outline mechanisms that farmers can use to minimize the impacts to resident wildlife populations.

In another area of education, wildlife biologists have produced a video describing the work of three landowners participating in wildlife demonstration farms.

Monitoring the populations of our more important small-game species is an ongoing part of our program. Surveys of our more avid grouse and quail hunters provide us with an index to regional populations of these species.

MIGRATORY BIRDS

Duck populations have finally begun to recover from the extended drought several years ago in the prairie breeding areas, although several important species remain at critically low levels. Migrant Canada goose populations continued to decline, and it is

KEN TAYLOR

***Biologists survey** northern flying squirrels in western North Carolina. These studies have found that the endangered squirrel inhabits at least eight high-elevation mountain ranges in the state.*

WILDLIFE MANAGEMENT

TERRY SHARPE

***Biologist Larry Warlick** (right) and a N.C. Forest Service forester evaluate the results of a prescribed burn. Several forest types in North Carolina require frequent fires to enhance wildlife habitat. Prescribed burns are good forest management practices.*

hoped that a new population-recovery plan in the Atlantic Flyway will be effective. The plan is based on intensive neck-collar studies carried out by North Carolina and other flyway states, and it includes reducing or eliminating the mortality of southern geese during migration and on the wintering grounds.

The wood duck continues to be the most important duck to North Carolina waterfowl hunters. To manage this species better, the Commission has joined a national initiative that, among other things, will develop new methods of monitoring the population status of wood ducks on a regional basis. Inability to do this in the past led to the decreased wood duck bag limits in the early season.

During the biennium, three Ducks Unlimited cooperative MARSH projects were completed. These include the Rodgerson Tract MARSH Project, which involved the purchase of 223 wetland acres in Martin County, the Ashpole Swamp MARSH Project, involving the acquisition of 42 wetland acres located in Robeson County, and the protection and enhancement of 60 acres of wetlands located along John's River in Burke County. The John's River Project was dedicated on May 21, 1992.

The Canada goose field-sanctuary program was continued during the biennium. The objective of this program is to increase wintering Canada goose populations in North Carolina through increased protection and habitat enhancement. Approximately 6,000 acres, in six locations in coastal and western regions, were leased and planted in corn and wheat for use by Canada geese and other wintering waterfowl. Peak waterfowl use of the sanctuaries, including Canada geese, snow geese, tundra swans and ducks, totaled 36,985 birds during the 1990-91 winter period and 39,500 birds during the same period in 1991-92.

FURBEARERS

Biologists continue to use various surveys to determine the population status and harvest levels for 13 fur-bearer species in North Carolina. Although harvest levels had declined for several years to an all-time low in the 1990-91 season, the reported harvest level for all fur bearer species increased in 1991-92. It appears that the downward trend in fur prices, due to oversupply and depressed economic conditions, may have ended.

The Commission's river otter-restoration efforts received a boost when a private donor gave $5,000 to the Commission to assist with restoration efforts. Biologists relocated a total of 72 river otters from coastal areas to the Catawba, Little Tennessee and French Broad rivers in western North Carolina during the period. Trappers donated 10 of these otters. Surveys conducted on both the Little Tennessee and French Broad rivers indicated that river otters from the releases had established themselves along both rivers.

Concerned about the obvious declines in mink populations, biologists began a cooperative study during the biennium to evaluate the effects of various environmental contaminants on mink in the coastal regions of North Carolina, South Carolina and Georgia. A total of 127 mink were obtained from trappers and fur dealers in North Carolina for use in the study.

Coyote populations appear to be increasing in size

WILD TURKEY RESTORATION ACCOMPLISHMENTS, 1987-92

Year	No. Sites Receiving Birds	No. Birds Relocated In-State	No. Birds Acquired From Other States	Total Number of Birds Relocated
1987	7	53	0	53
1988	9	120	0	120
1989	10	65	70 SC	135
1990	18	161	92 WI	253
1991	33	228	204 SC & 76 WI	508
1992	30	185	128 SC	313

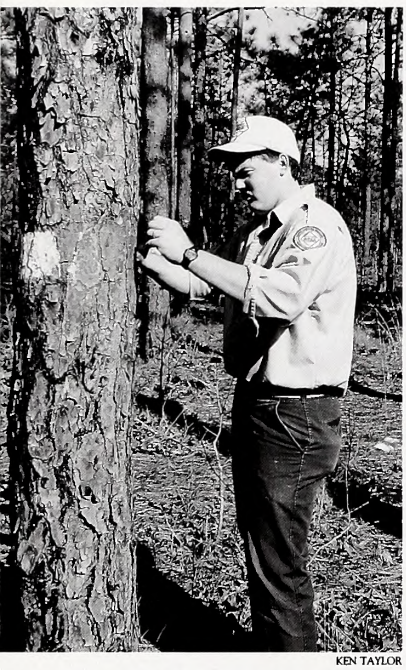
REPORTED BIG GAME HARVEST, 1989-1992

Species	1989	1990	1991	1992
White-tailed Deer	89,896	105,005	104,776	—
Wild Turkey	1,275	1,534	1,818	2,205
Black Bear	566	768	715	—
Wild Boar	147	110	92	—

A mourning dove *warms its young in its pine tree nest. Doves are one of the most popular game species in North Carolina. Though doves suffer a natural mortality rate that nears 80 percent annually, their populations rebound each year and hunting does not threaten them.*

JACK DERMID

WILDLIFE MANAGEMENT



KEN TAYLOR

At the Sandhills Game Land, *technician Tony Wait marks a longleaf pine tree to indicate the location of a red-cockaded woodpecker cavity. To protect this endangered bird species, Wildlife Commission foresters rake pine straw from around the tree before a burn. Precribed burns are necessary to maintain the open forest the bird requires.*

and distribution due to natural reproduction and illegal releases or escapes. Coyotes had been documented in 30 North Carolina counties by the end of the period. Efforts continue to document the occurrence of coyotes with physical evidence when possible.

Wildlife biologists continue to assist landowners suffering property damage resulting from the flooding and feeding activities of our expanding beaver population. During the period, Commission field personnel issued 524 depredation permits to property owners to allow the taking of beavers outside of the regular established trapping season.

WILDLIFE DISEASES

North Carolina began to experience outbreaks of rabies in terrestrial wildlife populations during the period. The first case of raccoon rabies was confirmed in Gates County in June 1991. Since that time, 13 raccoons and one gray fox were tested by the N.C. Division of Health Services in northeastern North Carolina and found to be positive for rabies. These rabies cases are probably the result of an extension of the mid-Atlantic rabies outbreak that has moved through Virginia into North Carolina. Three raccoons were found to be positive for rabies in Union County, located in the southern Piedmont region of North Carolina. The number of rabies cases in raccoons has been increasing in adjacent counties in South Carolina over the past few years.

LAND MANAGEMENT

The division's land management section is divided into three regions: Coastal, Central and Western. District biologists in each region monitor wildlife populations, comment on impacts of proposed development projects, and work with private landowners and other governmental agencies to help landowners manage wildlife on private lands. Other personnel are involved with management activities on public game lands. These activities are summarized below.

Coastal

During the biennium period, permit hunts were conducted for waterfowl on Pamlico Point, Campbell Creek and Spring Creek impoundments located on Goose Creek Game Land. Permit hunts were restric-

KEN TAYLOR

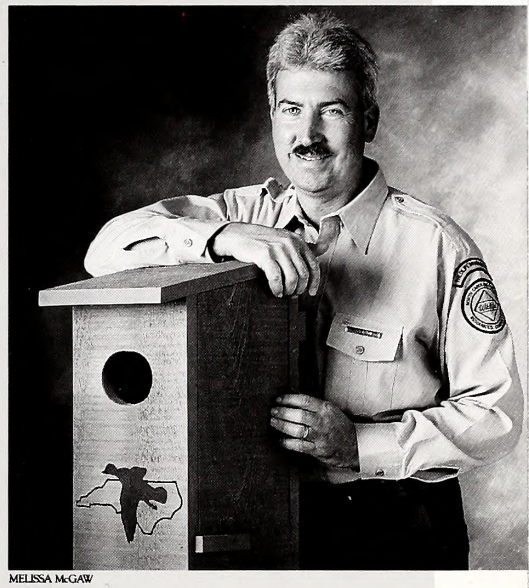
Biologist Scott Osborne *mans an educational booth at the annual Dixie Deer Classic in Raleigh. Working with the public at such forums is important to communicate information about hunting seasons and wildlife management.*

ted to "high pressure days" after November 1. Survey results continue to indicate that hunt quality and hunter success have been good.

An aggressive prescribed-burning program has continued on Coastal Region game lands. Over the past two years, 5,035 acres have been burned to improve habitat conditions for game and endangered species, timber growth and wildfire control. Several hundred acres have been burned during the growing season to improve habitat conditions for red-cockaded woodpeckers and to mimic natural summer fires.

During the past two years, 527 acres have been cruised and the timber marked for sale on Goose Creek Game Land. Emphasis has been placed on improving stands for wildlife and timber production. Because longleaf pine has declined to about 5 percent of its original acreage, attempts have been made to favor this species in the timber-marking operation. Special considerations were also given to red-cockaded woodpeckers, since many longleaf pine stands were located near colonies.

Jack Mason
District Biologist



MELISSA McGAW

The most important work I do as a district biologist is to provide general advice to the public, to hunt clubs and to other state or federal agencies that want information about wildlife or wildlife habitat. We also handle everything from alligators on a golf course to black bears in the back yard.

Our work has changed over the years. We do a lot more environmental reviews of housing projects or highway projects. When I first started to work, we didn't have a chance to comment on them and now we do. We can make recommendations if the project will damage wildlife habitat.

Probably the most important thing that I do is protect and improve wildlife habitat. My challenge is to protect wetlands, riparian habitats and key habitats like mast-producing hardwoods. If animals don't have a place to live, we're not going to have much wildlife in the future.

Central

In the Central Region, biologists, foresters and technicians manage 16 game lands that total 255,500 acres of leased and state-owned lands. On these areas they posted 653 miles of boundary lines, maintained 400 miles of hunter-access roads and eight hunter campgrounds. To improve habitat, personnel and co-op farmers planted 4,035 acres of wildlife foods and cover plots. Personnel also top-dressed 504 acres of plots, mowed 1,000 acres of wildlife openings and planted 21,710 wildlife food trees and shrubs. On the major game lands, 18,395 acres were control-burned to improve habitat for game and endangered species. Seven greentree waterfowl impoundments were operated on the New Hope Game Land by managing for optimum shallow flooding of bottomland hardwood timber.

At the Butner and Sandhills nurseries, 18 varieties of seed were grown and processed into 58,673 units of wildlife planting materials. During the two-year period, 320,075 pounds of seed were distributed statewide to the public and for use on game lands.

Western

In the west, biologists are coordinating with eight U.S. Forest Service ranger districts to improve wildlife habitat and public hunting opportunities along with other forest-management activities. Crews emphasized management of small game during the biennium. They established annual and perennial plantings for food and cover, mowed sod food plots in strips to improve cover, reduced maintenance on some food plots to develop old field type habitat and implemented fallow-field management practices in appropriate areas. These crews also constructed brush-pile shelters for small game in or near food plots whenever materials were available. On a 6,000-acre game-land tract, they completed work to incorporate forest-management practices and direct habitat improvements to enhance grouse habitat .

FOREST STEWARDSHIP

The Forest Stewardship Program has offered landowners an opportunity to improve small-game habitat in their woodlands. Teams of wildlife biologists, foresters, soil specialists and others work with landowners to develop plans to manage their forest lands. These plans include methods of maintaining or improving wildlife habitat. We are finding that many landowners want to improve wildlife populations on their property.

NONGAME AND ENDANGERED SPECIES

More than 200 animal species have now been listed by the state as "endangered," "threatened" or species of "special concern." Approximately half of these species are found in our state's freshwater ecosystems.

WILDLIFE MANAGEMENT

To protect the listed aquatic species, the Wildlife Commission is working closely with the Environmental Management Commission to protect 34 creek and river reaches that may be designated as Critical Habitats. These species will be helped through development projects that are better managed and through improved wastewater-treatment facilities.

Three new bald eagle nests were found during the past biennium bringing the total number of breeding territories in the state to nine. Eight eagles fledged from these nests during the period. The numbers of eagles wintering in the state continued to climb and the greatest total number (69) ever observed on mid-winter surveys was recorded in 1991-92.

Data were collected on 1,736 sea turtle nests during beach surveys by Commission staff and cooperators. In the summer of 1990, a record number of 805 nests were located and protected; but that record was exceeded in the summer of 1991 when 931 nests were recorded.

The colonial waterbird project got into full swing during the biennium. The Division of State Properties conveyed management allocation for 21 coastal islands to the Wildlife Commission. These are now under active management for colony-nesting waterbirds that include terns, gulls, skimmers, herons, egrets, pelicans and ibises.

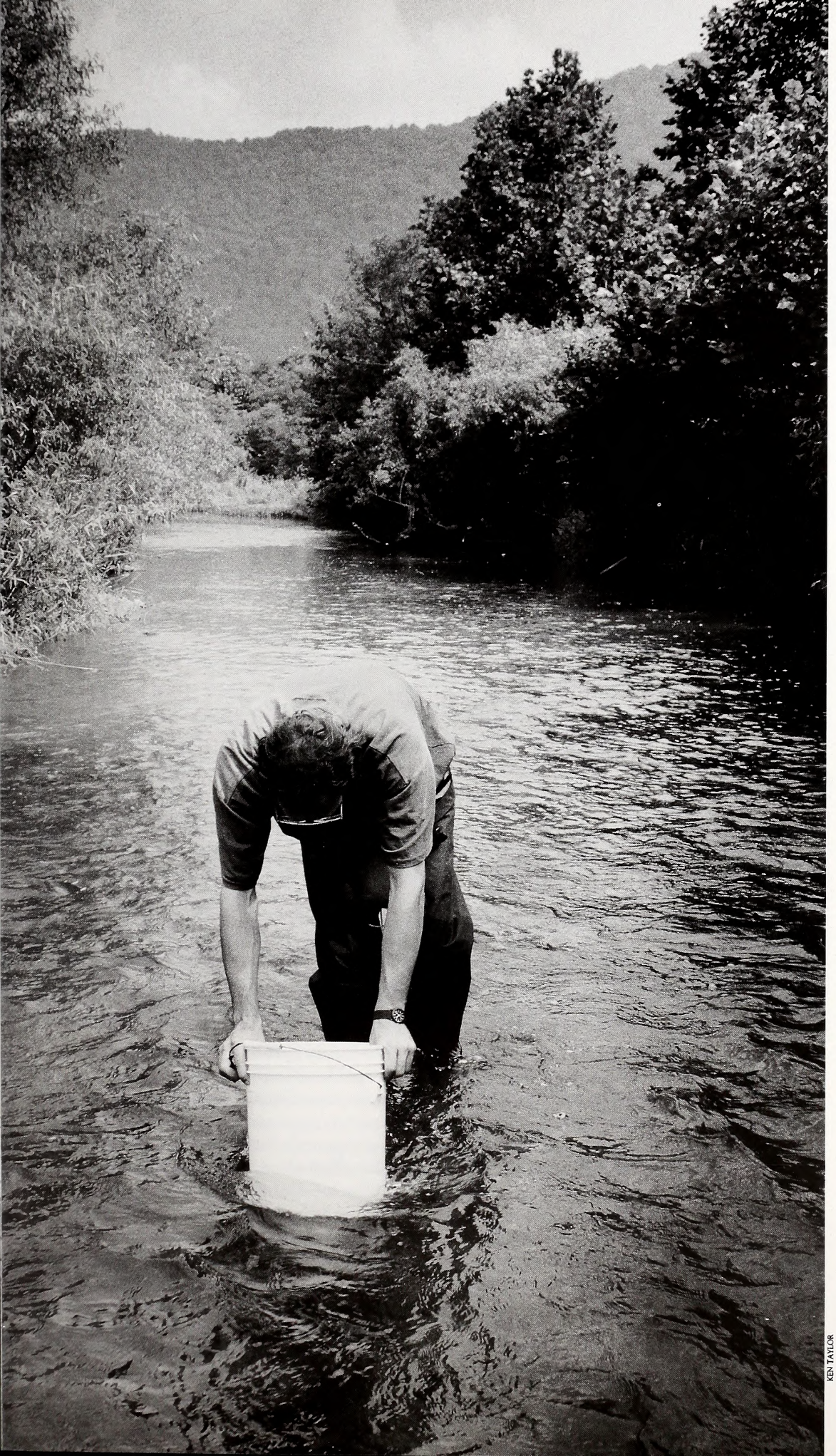
Biologists from Wake Forest University, supported by the Commission's nongame program, have completed a major study of populations of northern flying squirrels. The study found that the squirrels inhabit at least eight high-elevation mountain ranges in the state and favor the cool, moist environments found in north-facing gaps.

Peregrine falcon restoration efforts have continued during the past two years. Started in 1984, the project has resulted in the release of 81 captive-bred peregrines at five western North Carolina sites, and five to eight pairs have returned and established territories on western cliffs each year since 1988, producing 20 young falcons.

Other nongame projects have involved everything from bats to salamanders. Continued support by citizens contributing to the nongame check-off program on their state income tax will ensure continued progress in these projects.

KEN TAYLOR

Wildlife Commission biologist *Perry Sumner (right), Dr. Lucy Spellman (middle) of the NCSU College of Veterinary Medicine and an unidentified technician work with a captured river otter as part of the Commission's river otter restoration program. River otters are captured in coastal areas and relocated to the mountains. Dr. Spellman gives each otter a complete physical exam before the trip.*



KEN TAYLOR

***As part of the** Wildlife Commission's statewide aquatic mussel survey, a biologist peers through a glass-bottomed bucket for mussels, crawfish and snails on the Toe River in western North Carolina. Biologists are concerned about a decline in the populations of freshwater mussels.*

BOATING AND INLAND FISHERIES

Of all the responsibilities of the Division of Boating and Inland Fisheries, the most important are managing the freshwater fishes in public waters, building and maintaining access areas to waterways for boaters and fishermen, and reviewing proposed projects that threaten aquatic habitats. The division also maintains waterway markers, produces fish for stocking public waters, develops and evaluates fishing regulations, improves fish habitat, advises private pond owners and presents programs to the public.

Division accomplishments of the past biennium are described in the following report.

KEN TAYLOR

***At the site** of a mining operation, Steve Pozzanghera reviews a permit application with the mine operator. Mandated reviews of state or federal projects are critical to protecting wildlife and fisheries habitat. Biologists can recommend that projects be altered or denied to avoid or minimize damage to habitat.*

RESEARCH AND SURVEY

Coastal Region

Throughout much of North Carolina the largemouth bass is the premier sportfish. Research is being conducted in Sutton Lake near Wilmington to evaluate the growth and survival of the Florida largemouth bass strain. Because of its large adult size, the Florida bass has been stocked in other states to establish trophy fisheries. Florida bass fingerlings were stocked in Sutton Lake during the spring of 1992 and will be stocked for two more years. The bass population in the lake is being sampled to determine the fate of the introduced Florida bass and its effect on the existing bass population. The study will indicate if Florida bass can be used to establish a trophy fishery in North Carolina.

The restoration and enhancement of coastal stocks of striped bass continue to be of critical concern to the division. To more effectively manage the Roanoke River-Albemarle Sound striped bass population, the N.C. Wildlife Commission and N.C. Division of Marine Fisheries instituted a cooperative management agreement in 1991. The agreement established management areas for the two agencies and set harvest quotas for recreational and commercial fisheries. Since 1990, a creel survey has been used to estimate recreational harvest in relation to the harvest quota and to determine when seasons are closed. Intensive sampling efforts are conducted on the Roanoke River during the spring spawning season. Initial results suggest the population has increased slightly in the past few years. Poor spawning success since 1989, however, means that the fishery must continue to be protected.

Piedmont Region

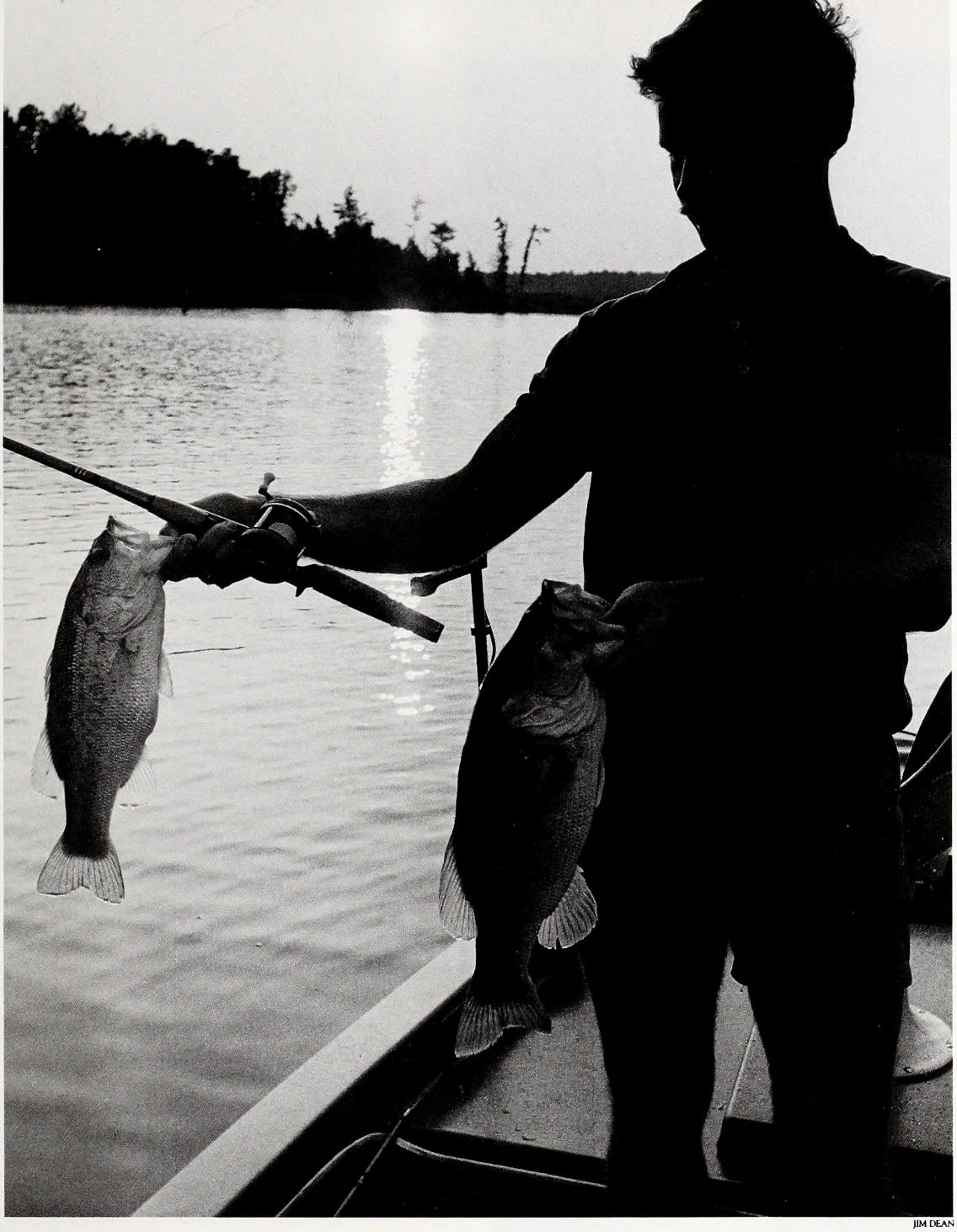
The Piedmont contains most of the state's population, and reservoirs supply most of the fishing opportunity in the region. Thus reservoir fisheries were the focus of research and survey efforts in the region, and reservoir fishing means largemouth bass, crappie, striped bass and catfish to most people. Biologists recently completed a four-year look at the 12- to 16-inch slot limits on Tuckertown and Falls of the Neuse reservoirs. The number of bass larger than 16 inches increased at both lakes during the study. Records kept by volunteer anglers showed that increased bass populations in the lakes improved the catch.

In 1991, the Commission revived an old idea to expand the bass information available. Bass clubs are sending their fishing tournament results to the North Carolina Tournament Largemouth Bass Catch Survey. Biologists will use this information to study changes in the quality of fishing over time. During the first year, the clubs reported 31,700 hours of tournament fishing. From that information, biologists calculate that it took about five hours to catch a legal fish in the state. That's slightly better than the same figure for 1983, the year we concluded the previous Bass Catch Survey!

If you see biologists fishing trap nets on your favorite lake in October, you can bet they are trying to learn the number, size, age and growth of the lake's crappie. Similar information collected on several Yadkin River reservoirs was used to justify an 8-inch minimum size limit and 20-fish creel limit for crappie at Tuckertown, Falls (Yadkin River), Badin and Tillery reservoirs. Biologists expect the change will delay harvest of small crappie until the fish are bigger and eventually make stringers heavier. Work has already begun to determine if the regulation can meet this goal.

The popularity of reservoir striped bass fishing is growing. The additional angling pressure on the fish means more and better information about striped bass populations is necessary to make good striped bass management decisions. The Commission conducted gill net and creel surveys during the biennium to help guide striped bass stocking and fishing regulation policies.

Like the striped bass, the flathead catfish is another fish prized for its large size and bad attitude on the end of a line. Big fish of any species, while seemingly difficult to catch, are also scarce and are often the first fish to be removed by heavy fishing pressure and harvest. Biologists interested in the trophy aspect of flathead catfish worked with



JIM DEAN

***A handsome catch** of bass rewards this angler after a long day. Largemouth bass continue to be avidly sought by fishermen statewide, but especially on the large warmwater reservoirs of the Piedmont.*

volunteer anglers through 1991 to learn more about this fish in the Yadkin/Pee Dee River reservoirs. Flathead anglers caught a fish about every five hours. When fishing in reservoir tailraces in spring, they caught a fish every two hours. Half of the reported catch was between 20 and 28 inches long. The study will be repeated periodically to see if the size and rate at which the fish are caught changes with time.

Fisheries management is not just about fish, but fishermen, too. The Commission conducted a mail survey during the biennium to discover how anglers feel about their sport and this agency's fish management programs. The report is still being prepared, but the information will be used by the Commission to help evaluate its current programs and provide direction for future activities.

Finally, not all of the Commission's Piedmont research and survey work was conducted by its own biologists. Several important cooperative studies with N.C. State University biologists were recently completed. The work provided important information about reservoir shad populations (a common food item for many reservoir fish) and young largemouth bass. The work may have important consequences for stocking programs and fish habitat management in Piedmont reservoirs.

Mountain Region

Although many people know fishing opportunities in the mountains include smallmouth bass, walleye,

and muskellunge, most relate the mountains to trout fishing. To that end, research and survey work has concentrated on the trout program over the last two years. This was the result of the Trout Management Plan adopted by the N.C. Wildlife Resources Commission in 1989.

In fall 1990, the Wildlife Commission, U.S. Forest Service and N.C. Trout Unlimited began a three-year cooperative project to determine the impact of supplemental feeding of wild trout streams on wild trout populations. North Carolina's trout streams produce relatively small numbers of insects on which trout feed. This project was designed to see if the wild trout would adapt to feeding on food in pellet form and if they did, how the trout populations would change with respect to the size and numbers of fish. The trout readily accepted eating the pelleted food. Initial sampling conducted during fall 1991 indicated the presence of larger fish, especially rainbow trout. In streams where brown trout occurred, biologists observed little difference in the number of larger fish. Sampling fish populations over two more years will be required to determine if the feeding is actually increasing wild trout growth and improving their chances to survive to older ages. A creel survey is planned for two of the study streams to determine how many fish are harvested by anglers and whether catch rates in areas where the fish are fed differ from the areas where fish are not fed.

A new regulation, called delayed harvest, was implemented during 1991 on portions of Ararat River, East Prong Roaring River, Jacobs Fork and Nantahala River. This regulation is intended to give anglers a place to fish for stocked fish and have higher than normal catch rates. It also is a place for children to learn to fish. Under this regulation, no fish may be kept between March 1 and the first Saturday in June. On the first Saturday in June, when the streams are less capable of holding trout, the regular "Hatchery Supported" regulations take effect and harvest is allowed. A creel survey of two of the four streams in the program indicated most anglers like the regulation. Catches of greater than 10 fish per trip were common. While detailed analysis of the creel data is not complete, it appears the target of a four-fish-per-hour catch rate was met.

The U.S. Forest Service, N.C. Trout Unlimited, and the Wildlife Resources Commission continue to cooperate in determining the distribution of brook trout throughout western North Carolina. The dwindling number of brook trout streams caused by the degradation of habitat and encroachment of brown and rainbow trout is a concern to fishery biologists. This survey will provide the basis for re-establishing brook trout in streams where they have been eliminated.

***Maintaining boating-access** areas throughout the state is an important way that the Wildlife Commission offers equal opportunity for all to enjoy fishing. Technicians maintain, renovate and build new access areas throughout the state. A total of 160 access areas have been built.*

JIM DEAN

FISHERIES MANAGEMENT PROGRAM

Coastal Region

Three public fishing piers, each accessible to the physically challenged, were constructed in the coastal region during the biennium. Two piers are located at the Shoupe Landing public fishing area in Gates County, on the Chowan River near Winton. The third pier is located at the Lake Rim public fishing area in Cumberland County. The Lake Rim dam and spillway were repaired and the lake was filled; however, public fishing is prohibited until July 1, 1993, to allow the sport fishery to develop. A small-boat launching facility, consisting of a gravel ramp and courtesy dock, was constructed at Richmond Mill Pond in Scotland County.

A boat corridor was cut on the Lumber River to improve public fishing access near public boat launching facilities. The Lumber River is a part of North Carolina's Natural and Scenic Rivers system and supports an excellent fishery. Approximately 60 miles were cleared enough to allow small boats to pass.

A total of 83 fish attractors comprising approximately 830 trees were placed in four lakes: Sutton Lake in New Hanover County, Richmond Mill Pond in Scotland County, Boiling Springs Lake in

Columbus County and Hope Mills City Lake in Cumberland County.

Piedmont Region

Public fishing areas were constructed on Badin Lake (Old Whitney) off NC 740, Lake Tillery (Lilly's Bridge) off SR 1111 (Montgomery Co.) and Kerr Lake (Williamsboro Wayside) off NC 39. Each public fishing area includes a graveled parking lot, access trails to the water and a shoreline clear of brush. In addition, fishing piers were constructed at Old Whitney and Lilly's Bridge, and fish baiting with cracked corn was conducted at these two sites from April through September.

Improvements were made at the Nutbush Bridge public fishing area at Kerr Lake by graveling and expanding the existing parking area. The Nutbush fishing pier had new steel hand and kick rails installed for safety along with warning signs for boaters. Also, posts and cables were erected to improve parking safety next to NC 39.

A brochure listing the sites of all the Commission's public fishing areas was recently completed and made available to the public. The brochure describes each site's location, types of fisheries and facilities available.

Fish attractors constructed of natural brush, Christmas trees, hardwood trees or artificial PVC "brush" were placed in 16 Piedmont lakes.

The Urban Fishing Program was expanded from the initial pilot study at Lake Oka T. Hester in Guilford County and now includes Lake Crabtree (Wake County), Lake Luke Marion (Moore County), and Reedy Creek Lake (Mecklenburg County). Fish attractors and fish feeders have been installed at these lakes and three of the lakes are stocked monthly (April-October) with catchable-size channel catfish. Creel- and size-minimum length limits for channel catfish were adopted effective July 1, 1992, at Oka T. Hester, Crabtree and Luke Marion lakes.

Mountain Region

A pier to accommodate physically challenged individuals was constructed on the Catawba River below Lake James (Bridgewater Powerhouse). The pier will allow physically challenged persons and others to enjoy a trout fishing experience. Angler access involved assisting the U.S. Forest Service with construction of a handicap-accessible trail on Wolf Creek.

A bank angler access trail was constructed at the Tsali Recreation Area on Fontana Reservoir. The project consisted of clearing brush and fallen logs from 2,000 feet of trailway and digging the trail to a level tread. Twelve fishing sites were prepared to accomodate bank anglers. Angler-access points also were established along the Jack Rabbit Mountain Trail at the U.S. Forest Service's Jack Rabbit Recreation Area. The project consisted of clearing brush and fallen logs from five sites along the trail.

Warm-water habitat improvement included placing fish attractors in 13 regional reservoirs.

Scott Van Horn
Fisheries Biologist

MELISSA McGAW

My work has been aimed at producing species management plans for bass, crappie and striped bass in warm-water reservoirs.

The question we ask ourselves is how do we sample fish populations so that we can track changes? That's the tricky part of being a reservoir fishery scientist.

When you can track changes in fish populations, you ask, what's driving those changes? Is it something that you can manipulate in a way that's beneficial to anglers or to the natural balance of the lake?

A third and important question is, what is it that anglers think they want? A lot of fish or a few big fish? We've been running angler opinion surveys for the last 15 years that help give us answers to that question. A lot of what a reservoir fish manager is all about is having a feel for what anglers want to see.

FISH PRODUCTION

Warm-water Production Program

The Fayetteville Fish Hatchery was not large enough to meet increasing fingerling production requests. To solve this problem, the Wildlife Commission purchased the Cape Fear Fish Hatchery located in Pender County near Watha, N.C. The hatchery was renamed Watha Fish Hatchery and it encompasses approximately 278 acres with 43 ponds totalling 55 acres of water. The Watha Hatchery is large enough to meet requirements for striped bass and channel catfish production.

Cool-water and Cold-water Production

Fish production in the mountains is directed at management activities for the region's cold-water fisheries. Three trout hatcheries are operated by the Commission and provide catchable and fingerling

trout to over 1,000 miles of "Hatchery Supported" streams and 1,100 acres of lakes and ponds open to public fishing. During the biennium, an average of 585,963 catchable trout were stocked annually throughout the mountain region. Over 57,000 fingerling trout were stocked annually in streams and lakes where trout reproduction was poor.

The stocking of cool-water fishes also play an important role in the region's fisheries management programs. During the biennium, over 250,000 walleye fry and fingerlings were stocked to supplement naturally-reproducing populations in mountain reservoirs. Muskellunge fingerlings were stocked in streams where muskie historically have occurred. Smallmouth bass fingerlings were stocked in areas where smallmouth reproduction was adversely affected by habitat degradation.

The monitoring program on fish health, which provides early detection and treatment of fish diseases in hatchery populations, was improved. Also, improved incubating systems for trout eggs were designed and tested for use under a variety of conditions.

FISH PRODUCTION PROGRAM

Warmwater Fishes Stocked

Species	Size	1991	1992	Total
Striped Bass	2"	147,538	520,500	668,038
	6"	11,966	*	11,966
Bodie Bass	2"	171,489	89,750	261,239
Largemouth Bass	2"-3"	1,100	7,500	8,600
Fla. Largemouth Bass	2"-3"	0	75,000	75,000
Bluegill Sunfish	1"-2"	43,882	80,549	124,431
Redear Sunfish	1"-2"	12,902	48,108	61,010
Redbreast Sunfish	1"-2"	0	2,000	2,000
Sunfish Hybrid	2"-3"	0	5,000	5,000
	4"-6"	9,050	8,710	17,760
Channel Catfish	2"-3"	0	28,000	28,000
	3"-4"	8,000	21,600	29,600
	4"-6"	0	30,070	30,070
	6"-8"	0	83,785	83,785
	10"	3,700	9,120	12,820
Threadfin Shad	(Adult)	24,962	97,859	122,821
TOTAL		**434,589**	**1,107,551**	**1,542,140**

*Scheduled to be stocked in December 1992

Coolwater Fishes Stocked

Species	1991	1992	Total
Walleye	163,012	103,735	266,747
Muskellunge	1,127	*	1,127
Smallmouth Bass	2,600	13,192	15,792
TOTAL	**166,739**	**116,927**	**282,666**

*1992 muskie not yet harvested

Coldwater Fishes Stocked

Species	1991	1992	Total
Catchable Trout			
Brook	150,290	135,976	286,266
Brown	132,880	148,181	281,061
Rainbow	293,962	310,636	604,598
TOTAL	**577,132**	**594,793**	**1,171,925**

Fingerling Trout Stocked

Species	1991	1992	Total
Brown	44,952	4,198	49,150
Rainbow	13,500	52,639	66,139
TOTAL	**58,452**	**56,837**	**115,289**

TECHNICAL GUIDANCE PROGRAM

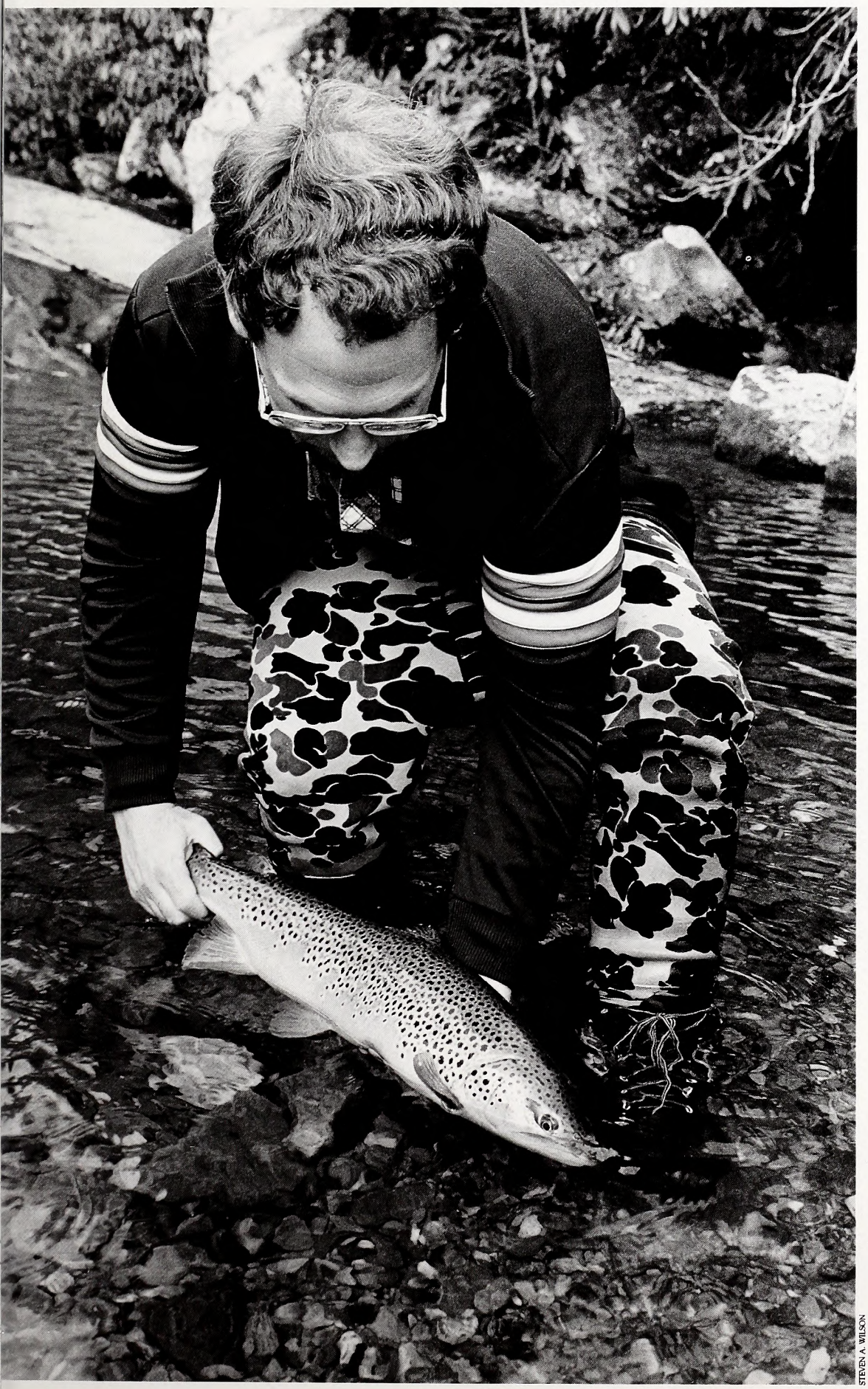
Division fishery biologists provided free technical assistance to 1,315 owners of farm ponds. This assistance included investigation of problems concerning fish population dynamics, disease and fish kills.

Sixty-six fish kills were investigated in public waters during the biennium. Wildlife Commission responsibilities are to investigate the extent of fish kills, and to assess total fish mortality and to compute fish replacement costs.

Habitat Conservation Program

The quality of fish and wildlife resources in North Carolina depends on the quantity and quality of aquatic, wetland and terrestrial habitats. The Wildlife Commission's responsibilities, mandated by state and federal law, are to protect, manage and conserve these habitats for the benefit of wildlife and the public. The primary mission of the Habitat Conservation Program is to promote the conservation and protection of fish and wildlife habitat. This is accomplished by reviewing state or federal projects that potentially affect habitat.

During this biennium, the division reviewed over 2,400 projects. Most of these project reviews required reports that included recommendations for avoiding, minimizing or mitigating impacts on fish and wildlife. Wetland areas, which include bottomland hardwoods, forested swamps, marshes, bogs, pocosins, streams and lakes were the primary areas of interest. This is because such habitats are especially important to a wide variety of wildlife species, including threatened and endangered plants and animals. In addition,



STEVEN A. WILSON

***This angler admires** his brown trout before releasing it. As part of its Trout Management Plan, the Fisheries Division is measuring the impact of supplemental feeding on wild trout in wild trout waters. Initial evidence shows that larger rainbow trout are present in waters with supplemental feeding.*

BOATING AND INLAND FISHERIES

wetlands store floodwaters, filter sediments and other pollutants from water, and recharge groundwater. As the state's population grows, fewer areas will remain for wildlife. The remaining areas must be protected and managed as high-quality habitat to maintain biodiversity in the state.

Our state is home to various mining operations, from peat mining on the coast to granite in the Piedmont, and there are many types of mining operations in the mountains. The year 1992 represented a permit-renewal year for active mine operations and the Habitat Conservation Program was able to assist the Land Quality Section in the Division of Land Resources in conducting site investigations of permitted mines. The number of renewal applications was high statewide, but the Piedmont region saw the heaviest mining permit activity. District biologists and the regional coordinators conducted site reviews and prepared comments on the impacts of mines on local fish and wildlife resources, including rare, threatened and endangered species. The program has been most effective in altering and modifying mine reclamation plans to restore wildlife habitat to sites where mining has been completed. With assistance from several of the state's large aggregate companies, the Habitat Conservation Program hopes to begin testing different reclamation techniques at ongoing mine operations.

The biennium also brought an environmentally controversial project to North Carolina's doorstep. As a member of the Southeastern Low-Level Radioactive Waste Compact, North Carolina is mandated to construct and operate a Low-Level

***A troop of scouts** is awed by a lunker largemouth bass displayed by fisheries biologist William Collart at a CATCH clinic in Cary. Educational efforts like these are an important part of biologists' responsibilities.*

MELISSA McGAW

Radioactive Waste Site by 1996. Currently, two sites, one on the Wake County/Chatham County line and one in Richmond County, are being intensively studied to determine if either area is suitable for the facility. The Habitat Conservation Program has worked closely with the Division of Radiation Protection, project sponsors and consultants and concerned citizens, to review this project, and these activities will continue into the next biennium. The role of the Habitat Conservation Program will be to assure that studies accurately depict the fish and wildlife resources that exist at the proposed sites.

Staff biologists in the mountain region saw an increase in the number of projects they have the authority to review due to a change instituted by the U.S. Army Corps of Engineers involving Nationwide Permits issued through Section 404 of the Clean Water Act. The Wilmington Corps District has exercised discretionary authority in issuing Nationwide Permits for work in waters of the 25 counties containing waters that support mountain trout. Project sponsors are now required to obtain a letter of concurrence from the Wildlife Commission before the Corps of Engineers will issue a permit authorizing the placement of fill material in waters of these counties.

Although this action taken by the Corps of Engineers has resulted in more work in the mountain region, this step is proving to be valuable in minimizing adverse impacts to all waters supporting trout in the region. Having this commenting authority will help ensure that this resource unique in the state will continue to serve as an indicator of high-quality waters and be available for the enjoyment of anglers.

BOATING FACILITIES PROGRAM

Commission personnel maintained 160 Wildlife Commission Boating Access Areas throughout the state during the 1990-92 biennium. Routine maintenance includes mowing and trimming, picking up trash, replacing signs, making minor repairs to docks and ramps and grading access roads and parking areas. These activities are generally carried out during the months of March through September.

In addition, the boating facilities program is receiving maintenance assistance from citizen support groups that are participating in our "Adopt-An-Access-Area" program. During the biennium, 42 access areas were adopted.

STEVEN A. WILSON

Anglers note *a posted sign that warns that no fish in certain mountain creeks can be kept between March 1 and the first Saturday in June. This regulation, called "delayed harvest," is intended to give anglers higher than average catch rates of stocked trout.*

Considerable efforts were made by our boating personnel to renovate boating access areas in all regions of the state. This work will provide improved services to the boating and fishing public.

During the biennium, three new boating access areas were constructed at Holdens Beach on the Intracoastal Waterway in Brunswick County; Ocracoke on the Pamlico Sound in Hyde County; and Tory Hole on the Cape Fear River in Bladen County.

In addition to constructing and maintaining boating access areas, our boating personnel are also responsible for maintaining over 900 safety buoys on public waters throughout the state. All buoys are routinely inspected twice a year to determine if they are on station, missing or need to be replaced because of normal wear or other damage. Buoys are also inspected periodically throughout the year when local storms and/or flooding may have caused buoy destruction or movement of a unit off station.

The Wildlife Commission's Boating Access Construction and Maintenance Program concentrated on upgrading areas during the last biennium. We plan to continue efforts toward improving existing sites that will provide better services to the boating and fishing public. Many of these projects have been made possible through the passage of the Wallop-Breaux Act in 1984, which provides additional federal funding for boating projects through the Sport Fish Restoration Program. This money is collected from federal taxes paid by boaters and fishermen when purchasing various items needed to participate in this recreational activity. ☒

CONSERVATION EDUCATION

During the biennium covered by this report, and continuing to the present, the primary focus of the Division of Conservation Education has been to educate North Carolina's citizens about the interrelated and essential roles of wildlife in our natural world. The world is being increasingly influenced by the public's accurate knowledge of natural resources, ecology and stewardship of the environment.

KEN TAYLOR

***A young angler** gets expert help as part of the division's CATCH (Caring for Aquatics Through Conservation Habits) program. During the past two years, over 11,000 children were exposed to fishing, sometimes for the first time, through CATCH. Now a comprehensive aquatic-education program, CATCH is available through the public schools.*

During the biennium, the division has made significant strides in improving the quality and quantity of its educational programs and materials. Also, a rapidly growing statewide program of teacher workshops coordinated through the state's public school systems has been greatly strengthened to ensure that these materials and proper instruction reach the public, especially educators. Two important programs developed have been the N.C. WILD and N.C. CATCH educational programs.

The division has also continued to publish and upgrade its award-winning monthly magazine, *Wildlife in North Carolina*, and has coordinated many of its published articles with other educational priorities such as WILD. Meanwhile, the division has continued to provide extensive support services in the form of publications and audiovisual material to other divisions within the N.C. Wildlife Resources Commission.

NORTH CAROLINA WILD

Perhaps the most extensive of the division's educational programs is N.C. WILD, an affiliation with the critically acclaimed national Project WILD program. N.C. WILD provides schoolteachers with an entertaining means to use the interrelated nature of wildlife, ecology, natural history and the environment in teaching the math, science, language arts, physical education and art concepts required by the state's competency-based curriculum. During the biennium, the division field staff conducted 489 WILD workshops and presentations across the state with 13,001 teachers and educators attending.

Also, during the biennium, the division began preparation of various publications to augment N.C. WILD. Among these is the forthcoming *North Carolina WILD Places: A Closer Look* and accompanying teacher's guide and posters. These publications will explore and explain many of North Carolina's natural habitats. Along with other WILD-oriented publications, division personnel began a series of fact sheets on North Carolina fish and wildlife species. Plans for over 100 profiles have been made. A video and teacher's guide were produced based on Chief Seattle's famous plea in the last century to protect our natural resources. The editorial staff continues to produce the popular and award-winning *North Carolina WILD Notebook*, a class-participation newsletter on natural history, wildlife and the environment that is published eight times each year.

As part of the CATCH program, *Celeste Wescott teaches schoolchildren about the hazards of aquatic litter. The division's environmental-education programs reach thousands of teachers each year who contact many more thousands of children.*

CONSERVATION EDUCATION

MELISSA McGAW

***In this advanced** aquatic WILD workshop at Harris Lake near Raleigh, teachers do a variety of experiments in stream ecology. N.C. WILD is the Wildlife Commission's popular environmental-education program for teachers.*

KEN TAYLOR

***Photographer Ken Taylor** checks his equipment before an underwater shoot in a Piedmont river. The division's two photographers provide many of the photographs for the Wildlife Commission, and especially for* Wildlife in North Carolina *magazine.*

NORTH CAROLINA CATCH

During the biennium, the division revised the CATCH program— formerly a series of statewide clinics to teach young people about fish and fishing —and expanded it into a comprehensive aquatic-education program of teacher workshops available through the public schools. As part of this program, the division began to prepare extensive texts including a student manual, teacher's guide, correlation with the state competency-based curriculum, posters and other needed material— all completed or nearing completion at the end of the biennium.

During the reporting period, the field staff conducted 275 CATCH clinics and presentations involving 11,115 youngsters. The in-school CATCH program was also field-tested in several locations.

YOUTH HUNTING

As part of a program to provide hunting opportunities and instruction on safety and ethics, the division held eight youth- hunting orientations and hunts geared to youth.

WILDLIFE IN NORTH CAROLINA MAGAZINE

The agency's monthly magazine, *Wildlife in North Carolina*, continued to enjoy widespread popularity during the biennium as evidenced by a paid circulation of 68,632 at of the end of the reporting period. A modest price increase implemented several months prior to the biennium brought increased revenues throughout the period, permitting the magazine to pay its printing costs and provide its educational and informative functions at relatively little cost to the agency. A new contract providing further savings in operational costs was prepared and awarded to a new printer during the biennium.

One of the most popular projects during the biennium was the publication of a special issue on endangered species. This issue has since been used widely by agencies and schools throughout the country. The magazine also continues to provide a mix of natural history, hunting and fishing, environmental outdoor recreation and Commission-oriented articles.

OTHER SERVICES AND PROGRAMS

As part of its normal function, the Division of Conservation Education provided countless services to other divisions within the agency. This includes assistance with the publication of hunting, fishing and trapping regulations, as well as numerous brochures, handouts, forms, posters and similar publications. These efforts also included the preparation of the popular N.C. *Wildlife Calendar*, cooperation and sponsorship of Big Sweep, continued design and typesetting support for the Wildlife Endowment Fund, administration of publicity and design for the agency's waterfowl and sportsman's stamp and print programs and preparation of photos and other audiovisual materials.

Donnan Robbins
Art Director

MELISSA McGAW

As a graphic designer and art director, I'm challenged by the desire to meet someone's needs for a publication while fulfilling my own sense of good design. Graphic design requires almost an inborn sense of balance of elements—text, photographs, illustrations and even white space.

Our job in the Conservation Education Division has changed over the years. *Wildlife in North Carolina* is still the most public thing we do, but we're very involved now in producing a growing number of educational publications for our CATCH and N.C. WILD programs.

I really feel we're going in a good direction. There's a lot of satisfaction in creating quality products that have a direct purpose in educating the public. That's where *my* satisfaction comes from.

AWARDS

The Division of Conservation Education won numerous awards during the reporting period for various programs and publications. Among the most significant were three 1991 North Carolina Take Pride in America awards for Big Sweep, *North Carolina WILD Notebook*, and for distinguished service in promoting stewardship of North Carolina's natural and cultural resources.

In international competition in 1990, the Association for Conservation Education presented the division three awards—two first place and one third place—for *North Carolina WILD Notebook*. The *Wildlife Calendar* also captured ACI first-place awards in 1990 and 1991, as well as an Award of Excellence in 1990, from the Printing Industry of the Carolinas (PICA). Several other certificates of excellence or appreciation for service were awarded to the division for various programs.

ADMINISTRATIVE SERVICES

The Division of Administrative Services provides high-quality administrative support for all activities of the N.C. Wildlife Resources Commission. Major responsibilities include handling fiscal transactions, processing data and collecting monies due. The division is also responsible for monitoring transactions to ensure that they are appropriate and that they comply with laws, rules and regulations. Additionally, the division prepares reports for use in management decisions and maintains records of every transaction for statistical and audit purposes.

To do this, sections within the Division of Administrative Services are responsible for specific areas of work.

In November 1991, some administrative sections involving boat registrations, licenses, magazine subscriptions, calendars and watercraft titling were moved from their previous location in the Archdale Building to expanded office space near Garner. The move provides better access to the public. Accounting, budgeting and purchasing sections remained in the Archdale Building.

SUMMARY OF OPERATIONS

	1990-91	1991-92
Cash Balance Carried Forward from Preceding Year	4,876,364.65	4,464,065.21
Net Receipts for Year	27,220,900.79	28,376,953.06
Total Available Funds	32,097,265.44	32,841,018.27
Less Expenditures	27,633,200.23	29,001,699.83
Cash Balance June 30, 1991	4,464,065.21	—
Cash Balance June 30, 1992	—	3,839,318.44

Expenditures July 1, 1991-June 30, 1992

	1990-91	1991-92
Administration		
Administration, Policy	775,292.08	811,511.17
Administrative Services		
Financial Services	442,856.70	451,625.49
Revenue Management	833,849.95	951,572.33
Data Processing	454,825.98	529,894.11
Watercraft Titling	140,754.46	156,725.83
Enforcement		
Law Enforcement	11,307,524.67	11,807,420.54
Conservation Education	2,082,189.89	2,053,829.85
Inland Fisheries	3,485,097.58	3,533,924.22
Construction and Maintenance	1,203,924.31	1,292,198.78
Wildlife Management	5,330,143.90	5,208,411.10
Nongame and Endangered Species	452,632.71	488,946.41
Reserves and Transfers	1,124,108.00	1,715,640.00
TOTAL EXPENDITURES	**27,633,200.23**	**29,001,699.83**

FINANCIAL MANAGEMENT

Finance

This section handles each agency transaction involving revenues or expenditures, including reporting, accounting for and maintaining records. During the biennium, checks were written for expenditures totaling $56.63 million. Revenues collected into the operating fund totaled $55.59 million, and Endowment Fund revenues were $6.27 million.

Purchasing, Mailroom, Stockroom, Warehouse

As with all sections of the Division of Administrative Services, this unit is totally service oriented. Its purpose is to assist and serve all other divisions and sections in the agency.

Since all purchases for supplies and materials exceeding $50 must be by purchase requisition, processing requisitions and orders for all agency employee purchases consumes a considerable amount of time. Purchase requisitions were monitored to verify compliance with guidelines established by the agency and approved by the State Purchase and Contract Division of the Department of Administration. Purchases of supplies, materials, equipment and services were handled by this section.

Postage expenditures during the biennium were in excess of $300,000 for first-class, presorted letter mail and third- and fourth-class mailings for a total of 776,721 pieces of mail. Almost 14,000 items of freight were shipped.

Almost all items for the stockroom and warehouse inventories were purchased from term contracts at the special rates provided by these contracts. This resulted in considerable savings of time and money for the agency.

The warehouse operation has, by necessity, grown steadily over the years and the last biennium was no exception. The warehouse is used for receiving, storing and issuing all inventoried stock.

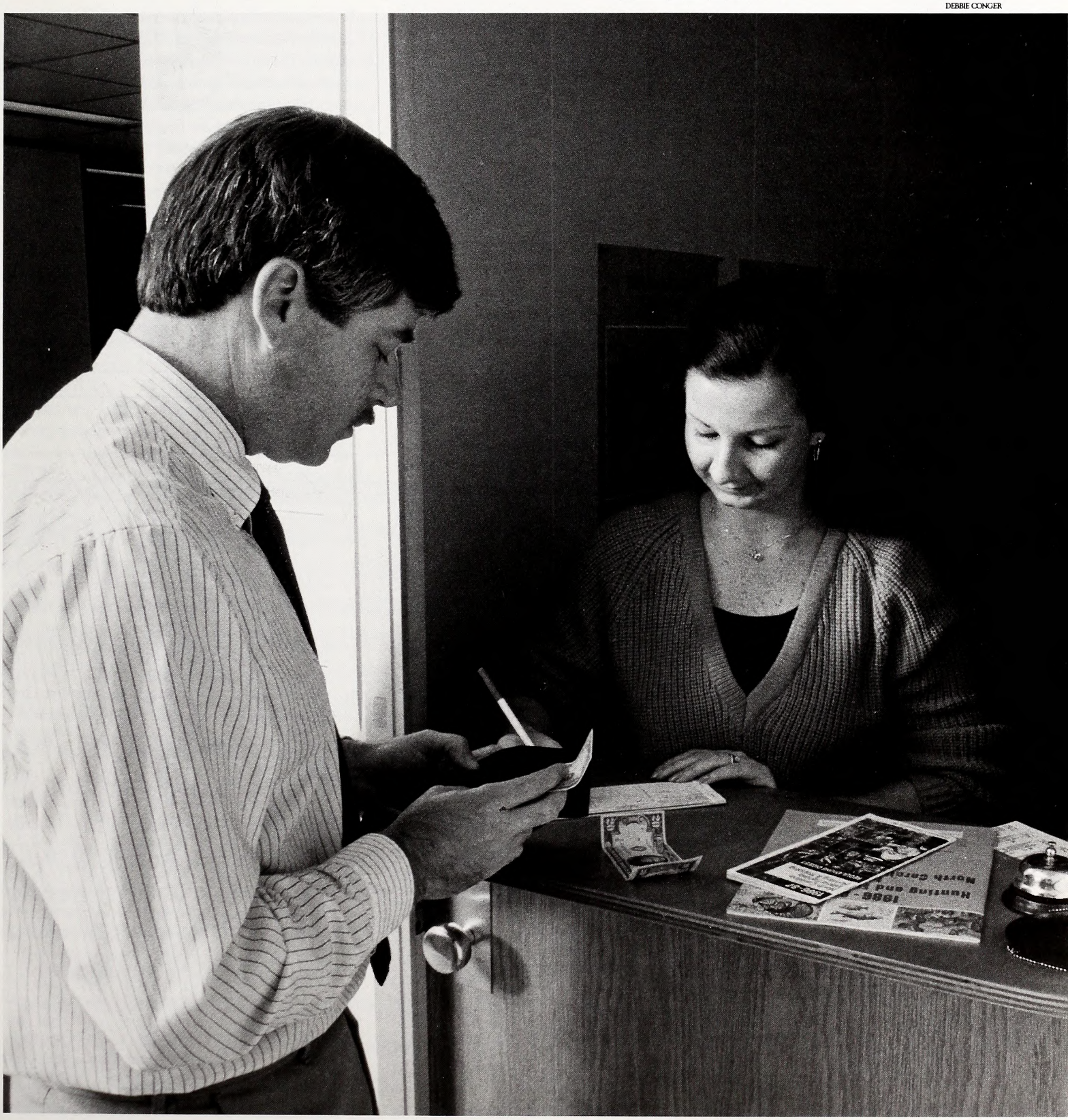
REVENUE MANAGEMENT

License Sales

The license section is responsible for selling hunting and fishing licenses, collecting and depositing revenues from these sales and maintaining records to account for each license.

Carmen Ryals *(right) sells a hunting license to a sportsman. The license section is one of a number of administrative sections that recently moved to a new location near Garner.*

DEBBIE CONGER



ADMINISTRATIVE SERVICES

With the help of 968 agents statewide, the license sales section sold 1.4 million licenses, netting $27.16 million in revenues for the agency during the biennium. The license section also sold 7,357 Endowment licenses, which brought in $2.2 million in revenues. The revenues, plus the interest, totaled $6.26 million for the biennium ending June 30, 1992. Proceeds from the sales of lifetime licenses are placed in the N.C. Wildlife Endowment Fund, which is restricted by statute, and are not available for use by the agency. Only the interest earned on these revenues may be expended.

This section also acts as a license agent for the Department of Environment, Health, and Natural Resources' Division of Marine Fisheries. Licenses that are sold include commercial fishing licenses, oyster, scallop and clam licenses and seafood dealers' licenses. These licenses are available at the Chapanoke Road office near Garner.

Boat Registration

All boats in North Carolina with motors, and sailboats 14 feet or longer at load waterline, must be

MELISSA McGAW

***Debra Faison** (left) and Clara Goss (right) of the License Section mail sportsman's license stamps to agents statewide. New stamps and licenses are made available each June, and mailings go out throughout the year.*

ENDOWMENT FUND

	Interest	Principal
1990-91	1,868,808.10	1,322,344.35
1991-92	2,027,854.15	1,057,160.92
TOTAL INTEREST AND PRINCIPAL	**3,896,662.25**	**2,379,505.27**

REVENUES—July 1, 1990-June 30, 1992

	1990-91	1991-92
Hunting and Fishing License	13,935,215.16	13,228,930.44
Bonding—Agents	15,043.00	14,231.00
Motorboat Registration	1,385,036.05	1,346,777.95
Watercraft Titling	118,310.00	113,550.00
Federal Cooperation	4,970,055.89	6,775,073.71
Management Area Receipts	5,950.00	11,365.00
Gasoline Fuel Tax	780,843.00	899,489.00
Transfer from State Property Fire Ins. Fund	20,500.00	—
Transfer from Revenue—Nongame Tax Check Off	510,269.80	384,465.06
Transfer from Revenue—Sales Tax	2,839,934.16	2,738,207.32
Transfer from Revenue—Dept of Justice	10,417.84	14,747.14
Transfer from Endowment Fund	1,048,085.00	841,801.00
Transfer from EHNR	0.00	144,343.38
Waterfowl Print Royalty	124,350.00	92,070.00
Sportsman Prints and Stamps	5,990.00	11,115.00
Book Royalty—Wildlife in North Carolina	780.29	437.91
Sale of Publications	398,539.95	407,028.92
Sale of Calendars	74,819.00	103,031.00
Sale of Prints	4,815.00	3,955.00
Sale of Surplus Property	140,217.34	106,492.22
Sale of Endowment Items	1,296.45	2,035.80
Sale of Conservation Items	4,353.75	3,978.69
Sale of Listings	14,435.01	16,952.55
Sale of Timber Products	486,146.10	770,655.35
Personalization Fees	8,010.00	6,880.00
Fees, Licenses and Fines	59,830.34	60,947.36
Replacement Costs of Wildlife Resources	34,700.16	27,086.77
Rental of State Property	2,394.00	464.50
Reimbursement of Fish Kills	19,606.56	12,898.47
Ducks Unlimited—Marsh Funds	0.00	9,327.28
Contribution—Black Bass	1,500.00	1,000.00
Donations	117,983.85	42,108.22
Miscellaneous	81,473.09	185,507.02
TOTAL REVENUES	**27,220,900.79**	**28,376,953.06**

registered. This section registers the boats and, with the help of 232 agents statewide, renews the registrations upon expiration. As of June 30, 1992, there were 284,584 vessels registered in North Carolina, an increase of 20,229 during the biennium.

It is the owner's option to register a vessel for either one year or three years with renewal at the end of the period. More than 125,000 registrations were renewed each year of the biennium.

This section must handle new licenses, transfers and renewals in a timely manner. This presents a challenge during warm-weather months when most vessel owners want to use their vessels and when most vessel registrations expire. Temporary help during the summer months enables this section to deposit monies daily and process registrations and renewals within 30 days of receipt.

Magazines, Calendars and Prints

During the past several years, the Wildife Commission has sold stamps and prints to collectors. Artwork is selected annually to be used on the waterfowl- and sportsman-license stamps, and prints are also produced from this artwork. This section handled the sale of prints and stamps through art dealers, who sell them to collectors.

During the biennium, a total of 68,571 regular and 1,123 lifetime subscriptions to *Wildlife in North Carolina* magazine were sold. Due to the subscription rate increase in February 1990, subscriptions dropped from 79,933 to 71,337; however, the increased revenue enabled the magazine to pay all its printing costs.

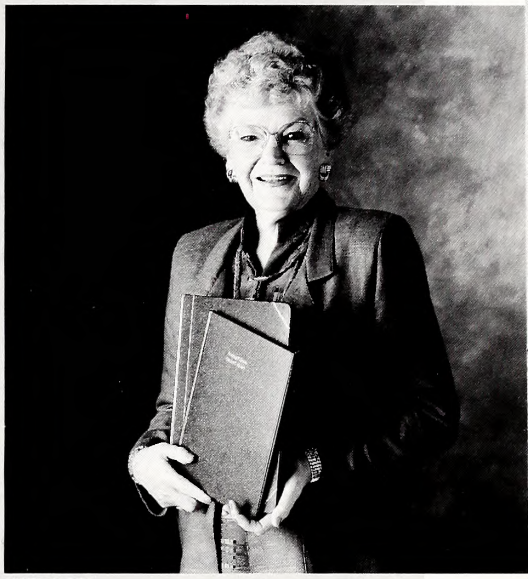
The growing popularity of the North Carolina *Wildlife Calendar* brought in revenues totaling $175,782. After selling out of 14,500 calendars for 1991, an additional 5,000 were purchased and sold for 1992. To handle the increased workload without additional staff, an outside vendor was contracted to ship the 1992 calendar. By using an outside vendor, orders were shipped promptly, time was saved by in-house staff and postage costs were reduced. As an added benefit, the decrease in postage costs paid the charges of the vendor.

This section also handles royalty payments received from the sale of Commission prints. Revenue generated during the biennium has been used to fund several agency projects.

WATERCRAFT TITLING

In January 1990, watercraft titling became available to watercraft owners in North Carolina on an optional basis. Since that time, 13,838 titles have been processed. A total of 750 titles was transferred, 115 duplicate titles were issued and 250 supplemental liens were added during the biennium. A total of $231,860 in revenues was received during the biennium.

Pearl Davis
Finance Manager


MELISSA McGAW

As the supervisor of the Financial Management Section, I'm responsible for seeing that the Wildlife Commission's obligations are paid and recorded. Basically, I balance the Commission's checkbook.

The real challenge of my job is getting the bills paid and the various reports prepared and submitted by the established monthly deadlines. This includes estimating quarterly expenses, requesting quarterly allotments of funds, then requisitioning funds and getting them set up as needed during the quarter to meet our fiscal obligations.

It's a satisfaction when your monthly work is complete and your books are in balance. You have a sense of accomplishment. Whenever you send that monthly report in and it's right, you think, well, that's another month behind us; we met our deadlines. By that time, we've also begun the process for the next month.

DATA PROCESSING

This section supports all agency divisions and programs. Some work of the section includes printing motorboat registration certificates and titles, printing hunter-safety student graduation cards and printing labels for monthly issues of subscriptions to *Wildlife in North Carolina.*

The section also inputs data to account for and report on all departmental and federal aid accounting, lifetime hunting and fishing license accounting (annual, permanent and lifetime), surveys, special hunts and harvest records.

During the biennium, hunter safety became mandatory for purchasing a hunting license, and boat titling became available to boat owners on an optional basis. The section placed additional emphasis on developing the data-processing programs to account for these new activities.

During the biennium, the Data Processing Section also began redesigning the boat registration computer program to provide the agency with on-line capability for accessing boat registration information in computer records. ☐

PERSONNEL SECTION

The Personnel Section handles the many personnel-related responsibilities for the permanent and part-time employees of the Wildlife Resources Commission. These responsibilities include recruitment, matters dealing with equal employment opportunity and affirmative action, employee relations, salary, maintenance of the health-insurance program and other employee benefits, and many other duties.

The Personnel Section is headed by the personnel officer and is comprised of a personnel technician, a payroll officer/accounting clerk and a personnel assistant.

During the biennium, Corinne Schoephoerster retired after serving 14 years in state government, including seven years as payroll officer for the Wildlife Commission. In the transition period between the retirement of the payroll officer and the current one, employees noticed no change in their pay receipt. The duties performed by this employee are important, affecting current, as well as, retired employees.

Several Wildlife employees served in the Persian Gulf crisis and Personnel assisted them in making the transition from the military back to their Wildlife Commission positions smoothly. The section also gave assistance to our employees' dependents and other family members. We received many questions about continued health coverage and employee benefits which were explained in detail by phone and letter.

The Shared Leave Program proved to be very beneficial for some of our employees who had or have prolonged illnesses. Employees were encouraged to plan their vacation times to prevent loss of annual leave in excess of 240 hours. The Personnel Assistant keeps employees abreast of their leave status. Workers compensation claims increased and extra emphasis has been placed on safety and employee awareness.

The Personnel Section strives to ensure that policies and procedures are planned and implemented in accordance with published guidelines. We are an Equal Opportunity Employer. ☒

MELISSA McGAW

Left to right, *Colleen Herndon, Marlene Creech and Mindy Callaway work in the Personnel Section, which assists employees in the areas of equal opportunity, health insurance and other employee benefits.*

Wildlife In North Carolina, at $7.50 a year for 12 issues, remains the best bargain around.

To store a year of *Wildlife In North Carolina*, order a classic leather-look binder.

Order your Nongame prints here. . .

Subscription Form

WILDLIFE IN NORTH CAROLINA

☐ RENEW or ☐ ENTER my own subscription

( ) 3 year $20.00 ( ) 1 year $7.50
( ) Lifetime $100.00

W93

512 N. Salisbury Street
Raleigh, N.C. 27604-1188

Your Name _____

Address _____

City _____ State _____ Zip _____

(If renewal, attach recent magazine label.)

Gift Subscription Form

Gift Subscription For _____

Address _____

City _____ State _____ Zip _____

( ) 3 year $20.00 ( ) 1 year $7.50 ( ) Lifetime $100.00 W93

Gift Subscription From _____

Address _____

City _____ State _____ Zip _____

You will receive a gift card to sign and send, and a renewal notice upon expiration. Allow one month for delivery of gift cards.

Make checks payable to: Wildlife in North Carolina, 512 N. Salisbury St., Raleigh, NC 27604-1188. Office is located at 322 Chapanoke Rd., Raleigh, NC 27603.

We do not bill. All orders must be prepaid. Do not send cash. Please allow 6-8 weeks for delivery on all subscriptions. Up to $20.00 service charge for returned checks (G.S. 25-3-512).

Magazine Binder Order Form

W93

Please send me _____ binders at $6.75 each. $ _____

Add Appropriate Sales Tax All N.C. residents add 6% sales tax per binder. (No sales tax for out-of-state residents.) $ _____

Enclosed is my check for Total $ _____

Ship to: **(Please use deliverable U.P.S. address)**

Name _____

Address _____

City _____ State _____ Zip _____

Make checks payable to: Wildlife in North Carolina, 512 N. Salisbury St., Raleigh, NC 27604-1188. Office is located at 322 Chapanoke Rd., Raleigh, NC 27603. Up to $20.00 service charge for returned checks (G.S. 25-3-512). Please allow 4-6 weeks for delivery.

Nongame & Endangered Wildlife Fund

W93

The Nongame and Endangered Wildlife Fund benefits such nongame projects as the restoration of the bald eagle and the peregrine falcon to North Carolina. Contributions to the fund, as well as proceeds from the sale of **nongame prints**, also support urban wildlife projects, conservation-education programs, watchable wildlife projects, and the purchase of wildlife habitat. The print measures 18 inches by 24 inches.

Yes, I would like to contribute and/or $ _____

Please send me ☐ *"Forest Life of the High Peaks"*
print and/or ☐ *"Colony-Nesting Waterbirds"*
print and/or ☐ *"Sandhills Longleaf Pine Forest"*
print and/or ☐ *"North Carolina Creeks"*
print and/or ☐ *"North Carolina Beaver Ponds"*
print @ $25.00 each. $ _____

*Add Appropriate Sales Tax $ _____

All N.C. residents add 6% sales tax per print. (No sales tax for out-of-state residents.)

Postage and Handling (per order) $ 5.00

Enclosed is my check for Total $ _____

PLEASE USE STREET ADDRESS FOR DELIVERY.

Name _____

Address _____

City/State/Zip _____

Please make check payable to Nongame & Endangered Wildlife Fund. Send order to Nongame Prints & Contributions, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, NC 27604-1188. Office is located at 322 Chapanoke Rd., Raleigh, NC 27603.

A $20.00 charge will be made on returned checks (N.C.G.S. 25-3-512). PLEASE ALLOW 4 WEEKS FOR DELIVERY.

Lifetime Licenses and Lifetime Magazine Subscriptions...

Complete and return entire page with proper payment (or credit card information). Our mailing address is: Wildlife Endowment Fund, License Section, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Archdale Building, Raleigh, N.C. 27604-1188. Office is located at 322 Chapanoke Rd., Raleigh, N.C. 27603. Please make checks payable to the Wildlife Endowment Fund. $20.00 service charge for returned checks (G.S.25-3-512).

	PRICE
☐ Lifetime Comprehensive Fishing (residents only) (includes basic fish, trout and trout waters on game lands)	$250.00
☐ Lifetime Subscription to *Wildlife in North Carolina* magazine	$100.00

Infant and Youth Licenses:

☐ Lifetime Sportsman Infant (under 1 year of age) (Application must be received before one year of age)	$200.00
☐ Personalized Lifetime Sportsman Infant (under 1 year of age) (Application must be received before one year of age)	$205.00
☐ Lifetime Sportsman Youth (age 1 through 11) (Application must be received before 12 years of age)	$350.00
☐ Personalized Lifetime Sportsman Youth (age 1 through 11)(Application must be received before 12 years of age)	$355.00

A copy of a certified birth certificate (or the mother's copy) must accompany applications for sportsman's licenses for infants and youths. Please note: Hospital copies will not be accepted. Also, birth certificates cannot be returned.

Pending satisfactory completion of the hunter safety course, persons who possess infant or youth licenses may exercise the privileges thereof when accompanied by an adult at least 21 years of age, who is properly licensed to hunt in North Carolina. "Accompanied" is defined as being able to take immediate control of the hunting device.

☐ Lifetime Sportsman (residents only) (age 12 or older) (includes basic hunt and fish, big game, game lands, primitive weapons, trout, N.C. waterfowl [Federal waterfowl stamp is mandatory and must be purchased separately.]).	$500.00
☐ Personalized Lifetime Sportsman (residents only) (age 12 or older)	$505.00
☐ Lifetime Nonresident Sportsman (age 12 or older) (includes basic hunt and fish, big game, game lands, primitive weapons, trout, N.C. waterfowl [Federal waterfowl stamp is mandatory and must be purchased separately.]).	$1,000.00
☐ Lifetime Comprehensive Hunting (residents only) (includes basic hunt, big game, game lands, primitive weapons)	$250.00

On or after July 1, 1991, a person, regardless of age, may not procure a hunting license or hunt in North Carolina without producing a certificate of competency for completing the hunter safety course or a hunting license effective prior to July 1, 1991, or making out a written statement that he had such a license.

Check appropriate block and attach required copy

☐ Copy of Prior Year Hunting License ☐ Copy of Hunter Safety Certificate of Competence

☐ In lieu of copy, I am completing a written statement (complete below).

STATEMENT: I CERTIFY THAT I WAS A LICENSED HUNTER PRIOR TO JULY 1, 1991.

Date _____ Signature of Applicant _____

PLEASE TYPE OR PRINT LEGIBLY

Applicant Name: _____
(First) (Middle) (Last)

Address: _____
(Street/R.F.D.) (City) (State) (Zip)

Date of Birth: _____ (Month/Day/Year) Social Security No.: _____ Driver's License No.: _____

Male: ☐ Female: ☐ Telephone Number: _____ County: _____

_____ _____
Date Applicant or Donor Signature

If a personalized lifetime sportsman's license is being ordered, please indicate your selection of letters, numbers, commas, or dashes. Only six spaces may be used.

_____ _____ _____ _____ _____ _____

The personal message for the personalized sportsman's license may include up to 21 spaces, including letters, numbers, dashes, periods, commas and/or blanks. Please write in your message as you wish it to appear.

_ _

Donor's Name and Address (if applicable)

_____

_____

_____

_____

☐ I wish to make a tax-deductible contribution to the Wildlife Endowment Fund. Enclosed is a check for $ _____. Please make checks payable to the Wildlife Endowment Fund.

N.C. Wildlife Resources Commission Merchant #843007550

To charge your purchase to your VISA or MasterCard you MUST complete the form below (donations cannot be charged).

Card Holder's Name and Address (Please Print)

_____

_____

_____

_____

☐ VISA ☐ MasterCard

Expires ___/___/___ Acct. No. _____

Card Owner's Signature _____

WFW93

DO NOT WRITE IN THIS SPACE FOR COMMISSION USE ONLY

_____ _ _ _ _ _ _ _

_____

Lifetime License $ _____

Lifetime Magazine $ _____

Total Charge $ _____

Authorization Code Number

_____

N.C. Wildlife Endowment Fund

Support the Nongame and Endangered Wildlife Fund

Your contributions support the management of colony-nesting waterbirds and other nongame and endangered species. Designate part of your state income-tax refund to the North Carolina Nongame and Endangered Wildlife Fund (see page 13 for program details).

Second-class postage paid at
Raleigh, North Carolina

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LYNCHBURG, VIRGINIA

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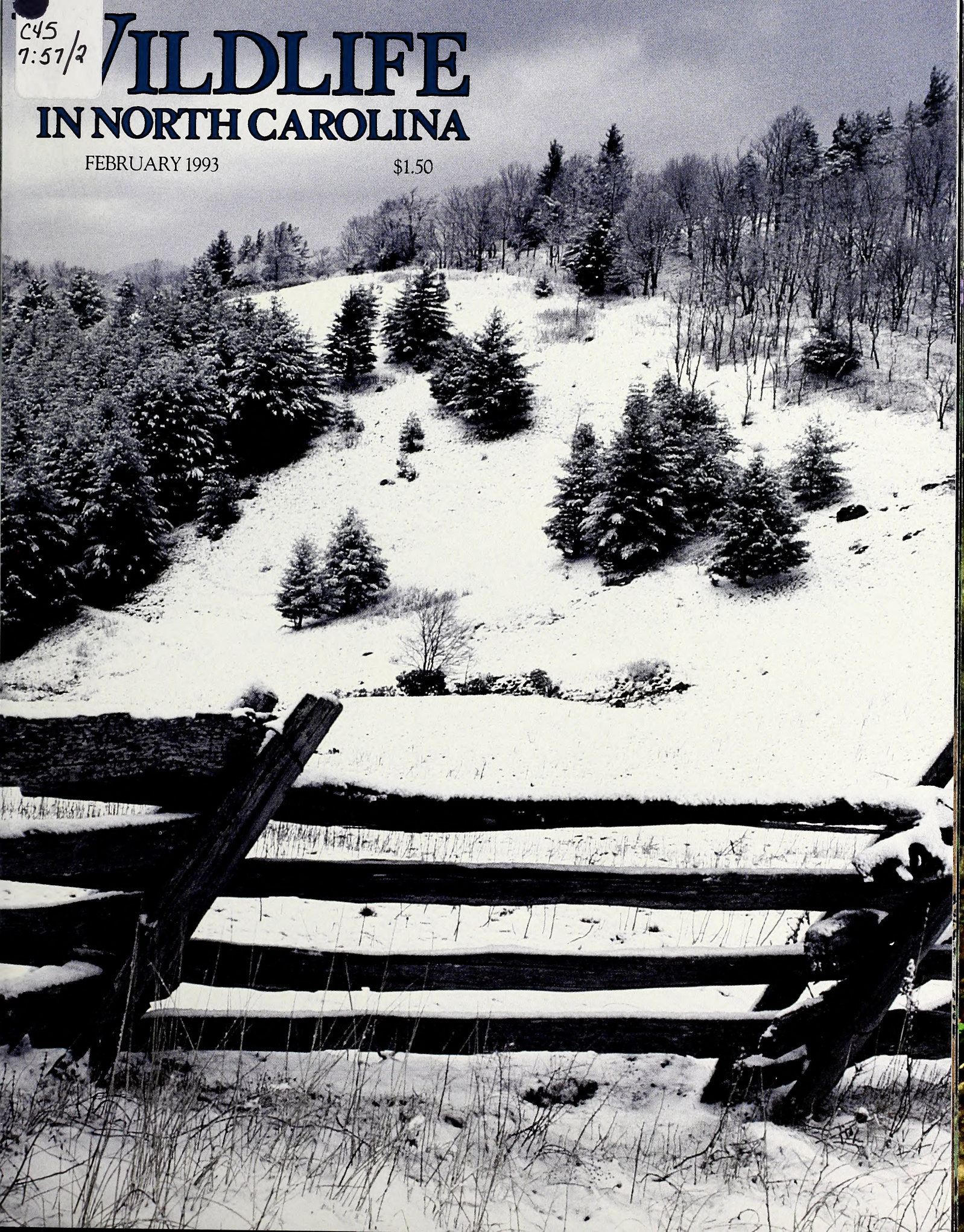
WILDLIFE IN NORTH CAROLINA

FEBRUARY 1993 $1.50



New Life for the Lodge

by Jim Dean

As you drive northwest along the outfall canal, the old smokestack and pump station rise above the pines. The stack—long ago converted into an observation tower—has walkways, a glassed enclosure on top and horizontal stripes that give it the appearance of a lighthouse that has somehow strayed too far inland. From the top, visitors once looked out over Lake Mattamuskeet, awed by the vast flocks of Canada geese that wintered here.

Indeed, this unique building and its tower—now listed on the National Register of Historic Places—may be one of the most recognizable landmarks in eastern North Carolina. Yet for nearly 20 years, it has been largely abandoned, slowly slipping into disrepair.

KEN TAYLOR

These days, however, visitors will notice a change. The stack's fading stripes are sporting bright new paint—the original blue and white—and the improvements are not just cosmetic. After years of neglect and thwarted efforts, the long-rumored plans to restore the grand matron of Mattamuskeet may finally become a reality. The U. S. Fish & Wildlife Service and a local volunteer group, Friends of Mattamuskeet Lodge, have already begun work to stabilize the structure. If money to complete restoration can be found, long-range plans call for the pump station to house offices for the Lake Mattamuskeet National Wildlife Refuge, a visitor center and a field research station for East Carolina University.

The area's fascinating history stretches back to 1789 when plans were first made to drain Lake Mattamuskeet and farm its rich bottom. In 1916, during one of several failed attempts to drain the lake, the pump station and stack were built. Then, in 1925, 81-year-old multimillionaire August Hecksher took over the project and installed four centrifugal Corliss engine steam pumps in the station. The pumps were capable of moving 250,000 gallons of water per minute, enough to drain the shallow lake in a single day. Hecksher laid out the town of New Holland, built roads and a rail line, and began to harvest record crops with a fleet of more than 50 tractors. Then, the dream began to unravel. Rains flooded fields during harvest, and pumps failed at inopportune times leaving equipment mired and crops rotting. In 1933, Hecksher gave up.

A year later, the federal government purchased the 40,000-acre lake and 10,000 surrounding acres, allowed the lake to refill, and established the Mattamuskeet National Wildlife Refuge. By 1937, nearly 50,000 Canada geese and countless ducks were wintering on the lake. In 1939, the U. S. Fish & Wildlife Service converted the pump station to a 38-room hunting lodge and, in cooperation with the N. C. Wildlife Resources Commission, began to operate controlled hunts in limited areas, leaving most of the lake and surrounding impoundments as a refuge. The wintering goose population continued to rise, reaching a high of 131,000 during the peak years from 1958 to 1964, and Lake Mattamuskeet was recognized as the goose-hunting capital of the world.

Although the Canada goose population has continued to grow in the Atlantic Flyway, the wintering population at Mattamuskeet dropped abruptly in the late 1960s as the geese began to winter farther north in the DelMarVa Peninsula, attracted by increasing grain crops. About the same time, Hyde County farmers were switching to early corn crops that did not favor geese. Also, the habitat at Mattamuskeet was maturing naturally, providing fewer fertile grasses and marshes. With fewer geese and hunters, the lodge closed in 1974.

Refuge Manager Don Temple says that while nearly $100,000 has been spent so far to stabilize the station and tower, it may take over $2 million and several years to complete the hoped-for restoration. Efforts are underway to find additional federal or other funds, and prospects look good. Meanwhile, those who're interested can make tax-deductible donations to the Friends of Mattamuskeet Lodge (a committee of the Hyde County Chamber of Commerce), P.O. Box 337, Englehard, N. C. 27824.

"Volunteers have done a terrific job, and 70 were here just one workday in November," says Kelly Davis, a refuge wildlife biologist. "In addition, contractors have been removing old vines, sand-blasting, painting and repairing the windows and roof. There's also plumbing and wiring to be repaired along with the installation of heat and air conditioning.

"There's a lot of history wrapped up in this place," says Davis. "About five years ago, I found a box of china in the pump station that had come from the New Holland Inn that burned in the 1930s. The china is on loan to the Hyde County Historical Society."

For many, that history is most closely connected to memories of honking geese flying over the lodge, to steaming breakfasts with hot oyster fritters and, most of all, to the shivering splendor of first light on Mattamuskeet.

Predators Belong

LEONARD LEE RUE

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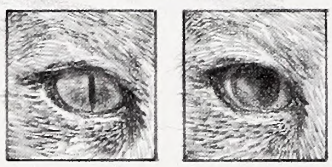
Cats are among *the fastest runners, but only over short distances. Fatique sets in quickly and if cats can't catch their prey with the first burst of speed, they stop.*

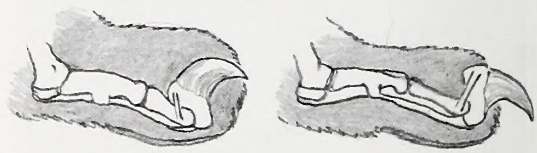
Cats' long, stiff whiskers *are quite sensitive, aiding them especially in hunting at night.*

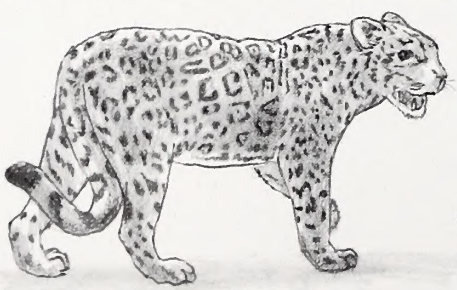
Fewer teeth *and a shortened jaw give the cat more biting pressure than most carnivores and enable them to kill with one bite.*



The binocular vision *of carnivores enables cats to focus on swiftly running prey. The pupils of small cats are round when fully expanded at night, but contract to a vertical slit.*

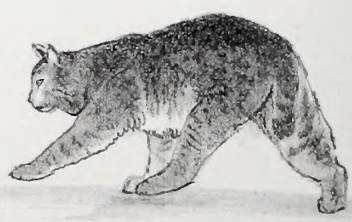
Cats can retract *their claws into sheaths when they aren't in use. This helps avoid general wear and tear on weapons that are critical for immobilizing prey. Like canids, cats run on their pads.*





The **jaguar** *may have occurred in North Carolina, although no one knows for sure.* Total length: *5 feet to 8.5 feet (including*

The **Eastern cougar** *once roamed in North Carolina.* Total length: *7 to 9 feet (including tail).* Weight: *150 to 200 pounds.*



The **bobcat** *ranges over much of North Carolina, but mostly in the Piedmont and mountains.* Total length: *24 to 40 inches*

Splendid Cats

written by Lawrence S. Earley/illustrated by David Williams

***The bobcat stealing** up on the cottontail sits at the apex of millions of years of evolution that have bestowed on cats a variety of marvelous adaptations—superb eyesight in the dark, razor-sharp claws, meat-shearing fangs and stealthy hunting habits.*

The legacy of cats, or felids, as zoologists refer to them, is rather slim in North Carolina today. Though there are 35 wild cat species in the world, only three (the bobcat, cougar and lynx) are common in North America and only one (the bobcat) still exists in the state. Other cats once found here—the Eastern cougar and possibly the jaguar and, long ago, the saber-toothed tiger—have become extinct or have fled.

Our single remaining native wild cat, the **bobcat**, is a small cat with a short, 5-inch tail. It preys on small mammals such as mice and cottontail rabbits, although it will eat birds and even large prey such as white-tailed deer. It's located throughout the state, although today it's more common in the Coastal Plain and the mountains.

The **cougar**, also called the puma, mountain lion or panther, is the largest North American cat, once roaming throughout North Carolina and terrifying early settlers with its courting screams. These long-tailed cats fed mainly on white-tailed deer, but they were exterminated from the state, along with wolves, by nervous settlers to protect free-ranging livestock. The Eastern cougar is considered extinct today.

Persistent reports of cougars in North Carolina are likely to be the result of escaped or illegally released non-native western cougars. Two cougars killed in Tyrrell County several years ago had tattoos in their ears and were found to be western subspecies.

The **jaguar** is confined today to the jungles of Central and South America, but the unfossilized bones of this big cat (the third largest of all the cats and the largest in the Western Hemisphere) were recovered in a cave in Tennessee. In historic times, jaguars were discovered—and hunted—by western-moving settlers in the mountains of Texas, New Mexico and Arizona. They may have prowled in North Carolina during the late Pleistocene (11,000 years ago), but the evidence is spotty.

As a group, cats are arguably the most carnivorous of all animals. Domestic cats and larger cats alike share basic physical and behavioral adaptations that equip them superbly for the task of hunting and killing prey. A basic behavioral difference between canids and felids (cats) is that most canids (foxes are an exception) tend to hunt in packs, while cats are for the most part solitary hunters. If you've watched a housecat stealthily approach a mouse or a bird and then pounce on it, you understand the basic hunting strategy of all cats.

Like dogs, cats run on their toes, but unlike them their claws are retracted into claw cases when they're not being used for hunting or climbing trees. Thus cats can run more quietly than dogs. Dogs have a better sense of smell than cats, but a cat's compact skull gives it more biting pressure.

Aiding their hunting is another extraordinary physical adaptation: their eyesight. Cats have binocular vision like all carnivores; they see in color and their eyes are very sensitive in dim light. Bobcats' pupils expand and become round in the dark, making them extremely effective night hunters. Curiously, the pupils of small cats like house cats and bobcats contract to a vertical slit, giving the cat a sinister air of mystery.

The fur trade, now curtailed, has been responsible for drawing many cat species world-wide to the brink of extinction. Yet behind their decline lies a more basic reason—the uncompromising human expansion into the wild places that are the last refuges of these magnificent predators.

***Cats have been domesticated** for thousands of years. Feral house cats have become major predators in the woods today.*

D. Williams

Saving Our Sounds

In a five-year search for consensus, the Albemarle-Pamlico Estuarine Study hatched a management plan that almost no one likes. *Pssst!* That may be just the key to its success.

by Lawrence S. Earley

After five years and $10 million, after scores of public meetings and 65 scientific studies, after several drafts and 11th-hour revisions, and after a lengthy search for an elusive consensus, a plan to restore the sickly Pamlico and Albemarle sounds will likely be approved this month.

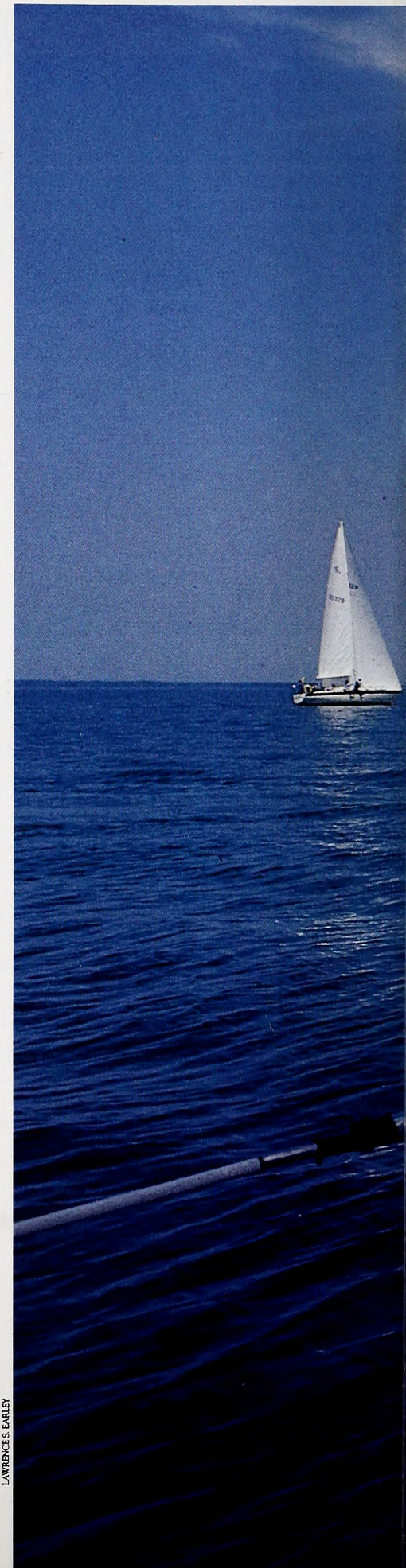
If it's like the first draft—over 300 pages of highly technical presentations—the Comprehensive Conservation Management Plan (CCMP) of the Albemarle-Pamlico Estuarine Study (APES) will be a formidable document. Those who expected the plan to propose restrictive new laws and regulations on dischargers, wetlands developers and the like will be disappointed—carrots rather than sticks are the order of the day. Others who wanted a few well-focused actions to emerge may also be disappointed—the management plan contains dozens of action plans, in no apparent priority order. And those who feared that the plan would slight the importance of economic development along the coast feel that this is exactly what has happened.

Indeed, in its preliminary stages, the CCMP seems to have succeeded in offending both ends of the coastal political spectrum, environmentalists and developers. Yet, though CCMP drafters are still hoping to achieve consensus with their final draft, they believe that the plan's staunch middle-of-the-road approach is its best bet for success.

As the second-largest estuarine complex in the United States (after Chesapeake Bay) and the third largest in North America, the Albemarle and Pamlico sounds lie like vast, green lagoons behind their barrier island bulwarks. They receive the daily flows of some of the largest rivers in the state, among them the Neuse, Pamlico, Pungo, Roanoke, Chowan and Alligator. So vast is this system that it represents 2,900 miles of protected inshore waters, 80 percent of the state's total. In effect, these rivers drain almost one third of the entire state, their watersheds extending as far west as Hillsborough in Orange County, north to Petersburg, Va., and south to Cape Lookout in Carteret County. As the plan states without exaggeration, the Albemarle-Pamlico estuarine system "dominates" the North Carolina coast.

It dominates the state's $1 billion-a-year commercial fishing industry as well. The Albemarle-Pamlico area (including Core Sound) ranks as the largest and most productive of all the state's estuaries, providing 55.2 percent of the state's commercial marine fisheries from 1972 to 1990. Recreational fishing also represents a significant portion of the annual harvest. Fisheries support 14,000 to 20,000 full-time jobs in the region.

In recent years, however, two trends have been at work throughout this vast area. One is the unprecedented growth in the region. From 1970 to 1990, the human population of the study area rose by over a half million, from 1,420,000 to almost 2 million. At the same time, the estuaries' waters began to suffer from plagues of environmental problems—periodic outbreaks of algae that robbed oxygen from water; terrifying diseases that seemed to eat right through fish and shellfish; declines in fish and shellfish harvests; and the disappearance of aquatic grass



***Across the vast reach** of Pamlico Sound, a fleet of sailboats seeks the wind during a weekend regatta. Recreational boaters are not the only ones who depend on clean coastal waters. Sportsmen, commercial fishermen and other citizens are all affected by the water quality in our sounds.*

LAWRENCE S. EARLEY

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KEN TAYLOR

***Freshwater wetlands** like this marsh fringing Pamlico Sound are nurseries for many different kinds of fish, shellfish and wildlife. The Albemarle-Pamlico Estuarine Study recommends a variety of strategies for preserving wetlands like these.*

beds, so necessary for sheltering and feeding marine life.

As the region developed, in addition, more and more wetlands were converted to other uses and more shellfish waters were closed due to pollution. Freshwater drainage from farms and forestry operations was blamed for alterations in the salinity of the sounds, possibly affecting their productivity.

Although scientists have been studying these problems for years, some evidence indicates that the problems are growing worse. From 1966 to 1984, for example, 87 fish and crab kills were reported on the Tar-Pamlico River. The annual kills increased each of the following five years, topped by 1989 when 69 kills were reported.

With the prospects of another half million people moving into the area by the year 2010, the questions grew more urgent. Were the problems in the estuaries really getting worse? Were they related to the expansion of the human population? And could the region both plan for more growth and restore its estuaries to health?

It was on the flood tide of questions like these that the Albemarle-Pamlico Estuarine Study was launched in 1987. In that year, under the authority of the Clean Water Act, the U.S. Environmental Protection Agency formed the National Estuary Program to identify "estuaries of national significance" threatened by growing human uses. In November 1987, the Albemarle-Pamlico study was named the first National Estuary Program, one of an eventual 17 such programs nationwide.

The goals of the Albemarle-Pamlico Estuarine Study (or APES, as it is often called) were to identify the environmental problems afflicting the estuaries and to develop a plan to keep them healthy. The plan was to represent the interests and the concerns not only of scientists, but of the citizens of the area and the special interests affected. To represent all of these groups, four committees were established. The Policy Committee had, among its goals, to form policies and goals for the program. The Technical Committee provided technical support to the Policy Committee. And two citizens-advisory committees, one for the Albemarle region and one for the Pamlico region, represented the concerns of citizens and a variety of interests including tourism, development, fishing, forestry and agriculture.

The five-year study was funded by $7.5 million from EPA and $2.5 million from the state of North Carolina, of which nearly 60 percent went to research and data acquisition, 15 percent to education and public involvement, 10 percent to information management and perhaps another 15 percent to program administration. The goal of this effort was to produce the comprehensive conservation management plan that would restore and maintain the health of the estuaries.

The plan is divided into five sections, corresponding to five major concerns.

- **Human Environment — Population Growth Action Plan**—This plan recognizes the problems affecting the estuaries due to human population growth in the region. Among other things, it recommends that local land-use and water-use plans be developed for all counties and municipalities in the Albemarle-Pamlico region.

• **Vital Terrestrial Areas and Wetlands Action Plan**—Highlights of this plan include a statewide comprehensive wetlands stewardship program for coastal and noncoastal wetlands, and increased acquisition of wetlands and other important terrestrial areas by government and private groups.

• **Water Quality Action Plan**—Some recommended actions are new funding to develop non-agricultural best management practices to control other non-point sources of pollution, coordinated guidelines for managing marinas, and strengthened water-quality policies on secondary treatment of waste.

• **Fisheries Action Plan**—A number of actions in this plan would control the overharvest of fish and shellfish, reduce the bycatch (non-target species), protect fish habitat, address fish and shellfish kills and diseases, and strengthen fisheries management.

• **Public Education and Involvement Action Plan**—This plan would develop and support environmental science education in primary and secondary schools in the state, and it would encourage more public involvement in environmental decision-making.

All in all, the management plan contains a total of 16 goals, 29 objectives and 51 actions.

One of the highlights in the plan, says Randy Waite, APES director, is a recommendation that both Virginia and North Carolina pass legislation requiring counties and municipalities in the study area to have land-use and water-use plans. Thirty-three of the 36 North Carolina counties in the study area and all 16 Virginia counties already have some form of land-use planning. "But that doesn't mean that their current land-use plans would meet the guidelines proposed to protect natural resources," says Waite. The proposal would extend mandatory land-use planning to cover nearly a third of the state. "Without trying to plan for the extraordinary growth this region will experience, we could find ourselves in serious trouble," explains Waite.

"The county can decide how it wants to grow and what it wants to do with its lands. We want to make sure the county plans on how its growth is going to impact the natural resources. We want the state to take a hand in saying that counties must plan for their effects on the environment."

As a basis for effective land-use planning, the CCMP also recommends the maintenance of a geographic information system for the APES area. Over the past five years, APES has given about $1 million to the N.C. Center for Geographic Information and Analysis to build up data for state and local planners in the region. This computerized system can produce maps showing as many as 48 different information "layers"—the location of wetlands, fisheries nursery areas, Wildlife Commission game lands, oyster-producing areas and municipal, state and county boundaries.

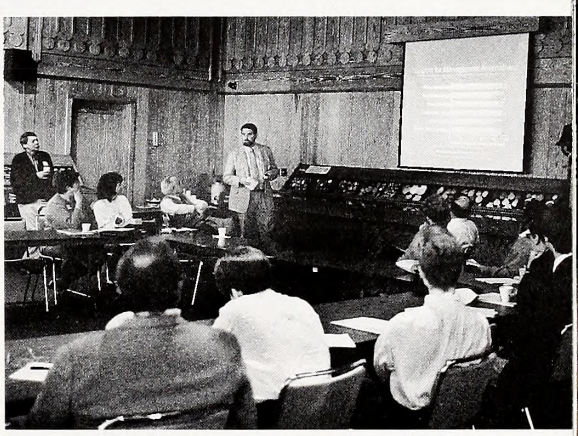
"We think this information system will help tremendously in the land-use planning process," says Waite. "It will allow planners to consider all the information they needed before, but which would have taken too much time to gather. "The study also recommends public access to the database by means of computer work stations in libraries and state aquariums in the region.

Another recommendation that Waite likes is one that would develop management plans for specific fish species to eliminate the overfishing threatening many of them. The N.C. Marine Fisheries Commission would be the lead agency in continuing to develop plans that might provide a basis for further regulations if necessary.

"The fishermen are concerned about that," admits Waite. "But these plans will give the fishermen some long-term planning ability. A lot of times, fishermen don't know what the restrictions will be even the day before the season opens. These plans will give us more predictability."

A third highlight of the plan, according to Waite, is the recommendation to increase government and non-government acquisition of vital terrestrial and wetland areas in the region. The topic of wetlands is controversial, especially in eastern North Carolina where the majority of North Carolina's wetland acreage occurs and where federal programs regulating wetlands have drawn fire in recent years. CCMP drafters don't recommend further regulation, but they recognize the value of these wetlands and other natural communities. By the year 2003, the plan recommends that the state purchase a minimum of 16,000 acres of rare, high-quality natural communities.

The plan also recommends that state, local and federal governments offer more



KEN TAYLOR

***From the beginning** of the five-year APES study, public involvement has been important in finding prescriptions to restore and maintain the health of North Carolina's ailing sounds. Citizen committees' recommendations were revised after being presented at public meetings.*

KEN TAYLOR

N. C. DIVISION OF MARINE FISHERIES

***APES-sponsored** scientific studies grappled with the complicated effects of forestry, agriculture, industry and towns on the water quality of Pamlico and Albemarle sounds (above). A symptom of the estuarine system's ill health, mats of algae like this one (left) erupt periodically along the lower reaches of coastal rivers like the Chowan and Neuse.*

incentive strategies to encourage private owners to protect rare communities and wetland areas on their property. "A lot of people are interested in being stewards," says Waite. "They're fascinated to find out that they have something that is so rare. All they want is some help so they can protect their property—tax incentives, conservation easements, covenants and the like."

Not surprisingly, the CCMP is characterized more by carrots than sticks. Incentives are in; new legislation and regulations, for the most part, are out. It was a planned strategy, says Waite.

"I guess we agree with the side that says, we don't need new rules because we haven't played out the rules we have. We're involved in a consensus-building process, working with people, rather than against them. . . . If we need more regulations later, great. But sometimes you can save money by helping people to do the right thing instead of forcing them."

But trying to reach a consensus among all the interests involved has proven to be an elusive quest. The first draft of the plan drew a surprising amount of criticism when it was released last July. It seemed that there was something in the plan that offended just about everybody.

Economic development interests complained that the five-year planning process was controlled from start to finish by environmental groups. Environmentalists dominated the composition of both citizens-advisory committees, says Ken Stewart, executive director of Economic Alliance of North Carolina, Inc., a group representing development interests. He blasted the CCMP as a "biased, one-sided view without consideration of economic development interests."

In a letter to APES director Waite written last fall, Stewart added that environmental protection, though important, was only a part of the coastal equation: "Public officials and the citizens of the area are concerned about jobs; infrastructure such as roads, water, sewer, schools and hospitals; tax base; affordable housing; productive traditional industries such as agriculture, forestry and fishing; and an improvement in the overall quality of life."

No less disappointed by the study's outcome were many in the enviromental community. Most praised the process that assembled a variety of people from different interests and got them to work together on a common goal. Yet the final product was like an out-of-shape boxer, they said, too heavy and cumbersome to fight well. Aimed at comprehensiveness, the management plan ended by being too bulky, too unfocused and too soft.

"We tackled every issue under the sun in this report," said Todd Miller, executive director of the N. C. Coastal Federation and a member of the Pamlico Citizens Advisory Committee. "As a result, we missed an opportunity to establish limited objectives with measureable results." He compares the bulky CCMP with a similar plan, the Chesapeake Bay Agreement of 1987, that concisely explained its goals and objectives in seven pages and established target dates for each action plan.

"In a lot of cases," added Dave McNaught, executive director of the Pamlico-Tar River Foundation, "the immediate action items in the CCMP are buried in a good deal of rhetoric. Some of the rhetoric is good, but what we'd like to see is an effort to highlight the most immediate and direct action items."

McNaught also blamed the consensus-building approach itself as a reason why the document seemed to lack hard-hitting plans. "When everyone sits down together to reach consensus, what happens all too frequently is that everyone is trying to make sure that their ox doesn't get gored," he said. "As a result, the final plan may be politically viable because it's come from a consensus of different parties, but it can't make clear recommendations of legitimate repair work because too many people are protecting [their own] interests."

Waite says he knows that not every part of the plan will meet with everyone's approval. That was the whole purpose of the consensus approach—to produce a document that could be supported as a whole. It's a matter of practicality, he says. "Environmentalists may want more regulation—say, restricting discharges into the estuary system, but we won't get that accomplished because the other side would object. This conference was set up to find some of the right answers that would work."

Derb Carter, an environmental lawyer for the Southern Environmental Law Center in Chapel Hill, also defends the comprehensive aims of the study. Carter was the chairman of the Pamlico Citizens Advisory Committee and also sat on the Policy Committee.

"It's important that the overall plan be comprehensive in assessing the existing problems and the adequacy of the existing programs to address these problems," he says. If the plan had limited aims, it would be subject to criticism that the plan had prejudged what the problems were, he adds. A comprehensive plan—one that identified the environmental problems in the estuaries and the shortcomings of existing regulatory programs—can result in more effective management of these two large sounds.

KEN TAYLOR

***The rich seafood resources** of the two sounds will continue to decline unless strategies, like the ones proposed in the APES conservation management plan, are implemented.*

Carter agrees, however, that the next step is to focus on action plans that are most critical and that can be accomplished with the state's limited resources. "We don't want this to become just another study that will sit on a shelf and collect dust."

These sentiments are echoed by almost everyone. All agree that the most critical factor in the management plan is to make sure that it's put to work. "We may think that we're finished with the management plan," says Waite, "but the battle has really just begun."

The plan calls for a coordinating body—the Albemarle-Pamlico Estuarine Council—to put the management plans to work. According to the preliminary draft, the 22-member council would be made up mostly by representatives of the state and federal agencies with current responsibilities for water quality, fisheries and related issues.

This may be more difficult than it seems. Waite admits that the idea of a coordinating council has made some agency heads nervous. Already the Division of Coastal Management has publicly expressed reservations about the council. According to Roger Shecter, director of Coastal Management, "I think more thought needs to be given to how existing authorities like Coastal Management would dovetail or overlap with an as yet non-existing authority like the implementation council."

"We're not recommending a new authority that would hand down edicts," Waite explains. The council would not have any regulatory power, but would be accountable for the plan's implementation. Criticism like Shecter's may mean that the composition of the council and the way it relates to other agencies will be revised by the time the document is approved in February.

Other weaknesses in the management plan will also be addressed by the time the final draft appears this month. After the second draft was released in December, it was subjected to another round of public meetings in January and still more revisions. After this process, the plan may achieve a tenuous consensus.

Even as it stands, however, the document provides a definitive overview of the problems in the nation's second largest estuary system. From now on, this will be the document that people refer to in grappling with eastern North Carolina's "troubled waters." After five years and millions of dollars worth of scientific scrutiny, one could expect nothing less.

Yet, it takes nothing away from the strengths of the document to say that the jury is still out on the Albemarle-Pamlico Estuarine Study. If it is to fulfill its expectations, it must produce actions that will accomplish what it set out to do five years ago—to restore the environmental health of the Albemarle and Pamlico estuarine system, North Carolina's largest and most precarious waterbody. ☐

Hunting with Herbert

The Golden Age of quail hunting may be gone, but whoever said bird hunting is a game of numbers?

written by David Henderson ©1993
illustrated by Shep Foley ©1993

It is 9:30 on a December morning and I have wedged my ample rear into the new pickup. Well, the almost new pickup that Cousin Herbert Jenkins has acquired after last season. The purchase of a new truck was sort of a challenge to the times, a symbol of never-say-die in an old bird hunter. We are heading out of Aulander toward St. Johns, and then who knows where?

I had arrived from Charlotte the night before, spinning east on 64 past Raleigh, then 301 to by-pass Rocky Mount. I do a dipsy-doodle to backtrack into the north edge of town along the river for supper at Bob Melton's barbeque, then onto 97 toward Hobgood, Oak City, and the long flat stretch across the Roanoke in the winter darkness to my destina-

tion. On this day, I had the misfortune of failing to see the slow-down at the metropolis of Leggetts. Oh well, the patrolman's invitation to visit in Tarboro on January 13th is something to be dealt with later.

At Skippy and Herbert's brick bungalow in Aulander, I delivered M's Christmas gifts, drank a cup of hot Russian tea (the pot stays on), and made my manners a few blocks away by visiting my 102-year-old Aunt Amorette, the last in the line, but still fiesty. Back in time to see the end of a Carolina ball game where Herbert (Wake) and I (Duke) cheered for the opposition. And then to bed.

As I get older, I'm a lot slower in the mornings and I appreciate more Havilah Babcock's conclusion that Bob White is a gentleman and doesn't get up early. Herbert agrees. Hence the late start in the pickup. Herbert's opinion matters. He is the consummate bird hunter. By the rules of one of my editors who is a journalism graduate, I should by the third paragraph tell you about the subject.

The man is almost 75 years old. He has been passionately dedicated to quail hunting for at least six decades. Living in the Choanoke section of the state, owning substantial acreage, and having been engaged in both the fertilizer business and tobacco warehousing, he has had every opportunity to intimately know many a farmer, and many a private covey. His Quail Woods Farms has qualified as the most outstanding environmental farm of the year, and even now is one of three experimental quail-feed laboratories for the state. He explained to me last year how he quantified the number and length of rows of soybeans necessary to be left standing for the survival of a resident covey of quail. Now that's dedication. All manner of VIPs have hunted with him, or seek to, from college presidents to artist Ralph McDonald.

Unlike any other living hunter I know, Herbert has more bird-sense than even my beloved late pointer Kate. And that's laying it on pretty strong. He is not a killing machine, but a better than average shot. He is a conservationist with a capital C, but knows and respects the farmer's need to operate profitably. He is also a man of passion, first for family, but close behind comes his esteem for *Colinus virginianus*. To the well-being of the bird, he has devoted as much time and money as anyone in the state.

All this prologue is necessary for me to bring you, the reader, into the truck cab with me, and later in the day to walk in my tracks behind good dogs with a man I have vested with the degree of MBH, or Master Bird Hunter. For the sport is *not* dead, and dog-work, managed territory, and companionship are still the name of the game. You are tired of hearing how it was in Buckingham's day, or when in the 1950s, Stoddard (or was it Rosene?) said that good territory is "that over which walking hunters could find 20 covies (sic) in a day's time." Well, you may never see that again, but hike up your chaps and follow Herbert and me.

In the double aluminum dog box, never off the truck from opening day 'til March, there are five broke bird dogs and a youngster just back from a trainer. The boss says he hasn't the patience to break a puppy, and perhaps age does that to us—we who spent so many hours hollering "whoa" and crashing through briers to choke off a bird-eater pup. A well-designed kennel at the residence houses up to 14 pointers and setters, with only recently a gift Brittany pup, the first no-tail ever at this place. So I long ago stopped hauling the Spooks and Macs and Polly Who's from Charlotte. It has been a rare year that this kennel lacked both quality and numbers.

My little 1100 twenty is racked below one of Herbert's Fox Sterlingworths, perhaps the twelve today. The weather is overly cold for December, a front obviously moving somewhere to the west. The morrow may be out, so we will be a little more intense than usual. Mostly, knowing some game is likely somewhere in the territory, we two veterans don't bust our

butts on a morning hunt. Decamping at the end of a rutted dirt track, careful to neither block a roadway nor "cut-up" a farmer's roadway, we put Sue and Lucky down, raise the jacket collars, pull on the gloves and follow.

A hundred yards behind a deserted tenant house lies a field with some vestige of soybeans standing after the combining. A layout weed patch seems to stretch another quarter-mile, flanking a pine thicket. Lucky, a red and white setter who stays on the ground almost all the time, has already cut the back edge of the beans and is locked up at the corner of the pines. Sue is backing smartly and we do not hurry. With this pair, only a streak of wildness in the covey will move it before we get there. The birds stick! I pick off the right flanker, miss a second straight away, and turn to see Herbert breaking his double. The dogs bring in three birds—large, plump and obviously in good condition. Crops show the beans, of course, but also a strange elongated seed we don't know. Herbert carefully puts samples in a film container for possible identification by his friend Ed Jones of N. C. State University.

Because of the late start and a dozen miles to go, we head for Woodland and the Quaker House restaurant, a must for all visiting bird hunters in the area. There I get to visit with Bill Burgwyn, a retired district attorney; his brother John, up from his plantation on the neck; Johnny Vaughn, farmer and hunter; and his brother Charles, an impeccably dressed lawyer on his way to court. All old friends of long years' standing. Peanut-fed country ham and vegetables family-style will get me every time. I plan to walk hard after lunch.

A phone message left at the cafe lets Herbert know that Dewey Wells, an old buddy, is back at Aulander and would like to join us for the afternoon. Dewey is a dead shot, hard-walking, knowledgeable quail man. He has been a judge, a member of the Wildlife Resources Commission, and now spends a lot of time fly fishing at his summer home in the mountains, where last year he gave me a hard lesson in roll-casting. We pick him up with his pair of pointers, one of which I'd like to take home with me.

A lot of farmers have taken advantage of pretty fall weather to disc their fields. While this may be good agricultural practice, it's hell on bird hunters, who must take to the swamps and thickets if birds are to be found. Now the Creator did not promise quailmen any rose garden, and it was intended that a price must be paid for so much fun—therefore, greenbriers, cutover, catbriers and down-timber. Our first foray is to beard the swamp-genie in his lair, and we take to the edges of Ahoskie Swamp on land of a family friend. New dogs now on the ground, we move briskly, find and shoot a small covey, leaving the singles for seed. A false point adds excitement, and of course we all say "they must have just left" out of deference to the dogs. Ice is rapidly skimming swamp water, and I hold dim prospects for the rest of the day.

In the face of worsening weather, we nevertheless elect to hunt what was once my Grandmother Jenkins' Creek Farm near Menola. A little 30-acre cutover has always been good to me. Once I stood on a 60-inch log on a covey flush and there got my only legitimate triple. As a matter of fact Herbert's short-legged setter Randy brought in a fourth bird. On this day we only pick up a couple, the bulk of a covey having flown wild. The darkening day apparently causes one of those rare happenings since one-by-one the birds fly right back in as we are moving out.

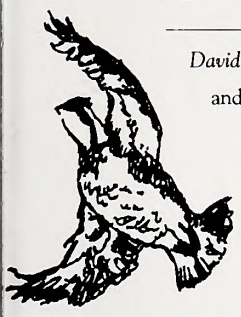
By now, however, a spitting snow has begun to leave its whiteness on bayberry in the swamps and fall-over grasses. If you have never hunted quail while snow flurries fall, you have missed the kind of winters your granddaddy told you about. It is a fascinating experience. This day the dogs worked hard, we hunted a farm near Woodland cut up by hedgerows and ditch banks, fortuitously left unmolested, and surprisingly picked up seven to eight birds before we had to call it off. But when your fingers, even gloved, are so cold you can't pull a trigger, it's time to pull for home.

Now 10 birds for a whole days hunt, with good dogs and pretty fair shooters would not have thrilled our granddaddies, but here in the 1990s, that's not a bad day's work. What has been important is that I have visited with my favorite cousin, spent the afternoon with a valued peer, seen outstanding dogs working great odds, shot reasonably well, and of the factors involved—dogs, game, and companions I love—I have to go along with First Corinthians—and the "greatest of these is love."

No, it's not like it used to be, but then maybe it never was!

Note: For the first time in 60 years, Herbert will not be able to open the season. A severe back problem defers his hunting. His many hunting buddies will wish him well.

David Henderson's latest book is On Point: A Bedside Reader for Hunters and Fishermen. *See book review this issue, page 30.*



In Pursuit *of* Rare Bats

Wildlife Commission biologists have been searching for some of the rarest mammals in our state. What they've found is only a start.

by Allen Boynton

It was a beautiful afternoon in mid-March, still winter, but with the promise of spring in the air. We were climbing a steep mountainside in southwestern North Carolina where we would find a cave, according to our leader, Cato Holler, a skilled spelunker from Old Fort. Though he hadn't been there in several years, Holler said that he and Bob Currie, a biologist with the U.S. Fish and Wildlife Service, had seen rare *Myotis* bats in this cave.

But where was the cave? As we clambered over rock outcrops searching for the small entrance, our frustration grew. Finally, at dusk, N.C. Wildlife Resources Commission wildlife technicians David Allen and David Woody stumbled onto the entrance. A quick tour of the cave revealed that a small bat population was still present. So were an old burnt broom and plastic milk jug stained by gasoline. Cato and Bob had found this evidence of vandalism on their previous visit.

We counted 69 little brown myotis—but not the rare species we'd hoped for—and 84 pipistrelles, another common bat species in western North Carolina. We were a bit disappointed. We were hoping that this hibernating colony would contain northern long-eared myotis, a somewhat rarer species and one given special protection by the Wildlife

JAMES F. PARNELL

***Although some bat species**, like this big brown bat* (Eptesicus fuscus)*, are still common, many are apparently declining, most likely because of pesticide use, habitat destruction and roost disturbance. In recent years, the Wildlife Commission's Nongame and Endangered Wildlife program has been surveying North Carolina caves to track bat populations.*

Bats in Your Belfry?

Bats can seriously damage a building and even cause health problems in humans, but killing troublesome bats isn't the solution. A better idea may lie in learning something of their life history.

Big brown bats are the most common nuisance bat in western North Carolina. They prefer a warm location in which to rear their young. They will use attics of older houses when they can find a way in through a small opening. They breed during winter and the female stores the sperm until spring. Ovulation occurs in early spring and two young are born around the beginning of June after a two-month gestation. The young bats cling to their mother during the day, but not while she is feeding at night. The young grow rapidly and can fly by late June. Big brown bat maternity colonies may or may not vacate the premises in late August. These are extremely hardy bats, and some stay in buildings through most of the winter. Indeed, colonies will often use the same building for many years.

One usually first notices bats when they are rearing young. The mothers are busy feeding themselves, and the young somehow turn up in occupied rooms below. Pets catch them when they begin to fly.

To rid your house of bats, you must first watch at dusk to determine where the bats are getting in. There may be several entrances. Small droppings stuck to the side of the building should indicate likely spots. Block all entrances that bats are using with hardware cloth or screen. Leave no space larger than ½ inch in diameter and close cracks larger than ¼ by 1 inch. Since bats often use a building only during late spring and summer, you may want to wait until fall to block entrances. Don't isolate flightless young bats from their mothers.

Special measures may be called for if your bat colony stays all year; however, North Carolina does not permit the use of poisons on bats. Poisons rarely kill all the bats in a colony outright and they do not prevent more bats from moving in. Also, poisons that kill bats may cause health problems to the persons living in the treated house. Under no circumstances should you allow anyone to use pesticides in your home to control nuisance bats.

You can get more information about controlling or attracting bats—some can be desirable neighbors—from two good books: *America's Neighborhood Bats* by Merlin Tuttle (University of Texas Press) and *Just Bats* by M. B. Fenton (University of Toronto Press). Tuttle's book has simple plans for bat houses as well as directions for getting bats to move in. He also presents good, common sense advice about getting rid of nuisance bats.

Commission in 1989. Yet our long climb over rugged terrain proved to be a somewhat typical afternoon for biologists on a quest for some of the rarest mammals in the state.

In 1990, the Commission's Nongame and Endangered Wildlife Program received a federal grant to look for rare bats in the many small caves scattered throughout our mountains. Currie and Holler, who founded the N. C. Cave Survey, have studied bats in western North Carolina for several years. The two provided historical information on the area's bats, as did the N. C. Museum of Natural Science and the N. C. Natural Heritage Program. Cato was a key partner in this work, since he had been to most caves in our mountains. The Commission contracted with Cato to help with the bat counts.

The work got under way in October 1990 and continued through June 1992. We looked at 11 caves or mines that sheltered rare bats. We searched many more that proved unsuitable, though they often contained other, more common, bats.

At least 11 species of bats occur in western North Carolina. Two unusual species called big-eared bats are among the area's rare bats. One look at these creatures will explain the name. Their extended ears are over an inch long, and they wave weirdly when seen in a cave or mine during warm months. In winter, the ears curl like rams' horns when the bats cluster to withstand the cold. The Virginia big-eared bat is a federally listed endangered species found in North Carolina principally in Avery County. The Rafinesque's big-eared bat lives both on our coast and in our southwestern mountains, but apparently not in between. These two populations of the Rafinesque's big-eared bat are separate races. This species may rear young in houses, whereas the Virginia big-eared bat (eastern subspecies of the western big-eared bat) uses caves and mines exclusively.

The Indiana myotis, the small-footed myotis and the long-eared myotis are other rare bats in North Carolina's mountains. These three small bats like to hibernate in cold caves. All three species make small maternity colonies in hollow trees or under loose tree bark to rear young in summer. The Indiana myotis is very rare in North Carolina. In winter, it prefers to hibernate in the large limestone caves found west of us; in summer, it migrates north to form its maternity colonies. Not much is known about the small-footed myotis. We see it in North Carolina primarily as a winter bat. The long-eared myotis is equally mysterious, though perhaps more common than the small-footed myotis. This bat often blunders into bat traps placed in mountain woodlands, and it is seen during winter in caves.

The big brown bat and the eastern pipistrelle overwinter in caves that are not suitable for other species. Each species of bat has slightly different demands for a hibernating site. Caves or mines that have more than one entrance and complex passages usually have a range of temperature and humidity likely to provide good hibernating conditions. These are the sites most likely to house a diverse bat community.

The Hickory Nut Gorge area in Rutherford County is important habitat to North Carolina's uncommon bats. We found six species of bats that use Hickory Nut Gorge caves regularly during the winter months: the eastern pipistrelle, the big-brown bat, the little brown myotis, the small-footed myotis, the northern long-eared myotis and the Indiana myotis.

One of the caves found in this area, Bat Cave, is the largest known fissure cave in the world. There really are bats in Bat Cave, and our highest count ever for this cave was 174 bats on January 25, 1991. We counted 170 eastern pipistrelles, two little brown myotis, one Indiana myotis and one small-footed myotis, a respectable bat count for a North Carolina cave. Of course, there were more bats present than we counted. It's easy to miss these small creatures hidden in remote crevices.

Yet compared to large limestone caves in some Midwestern states where hundreds of thousands of bats once congregated, our

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NORTH CAROLINA NONGAME & ENDANGERED WILDLIFE FUND

Your donations to the Nongame and Endangered Species Program mean that many endangered species have a chance for survival. Please keep giving. Make your contribution through the state income tax checkoff or directly to the Nongame & Endangered Wildlife Fund, N. C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N. C. 27604-1188.

fissure and boulder caves hold small numbers of bats, and their numbers are declining. Bats that depend on caves for shelter have seen their populations dwindle in recent years probably because of habitat destruction, colony disturbance and pesticide use.

At one time, Bat Cave may have had a winter colony of several hundred Indiana myotis. Some Northern caves and mines with small colonies 50 years ago now have only occasional individuals. One reason wildlife biologists have undertaken a census of cave bats in our mountains is to get data for future comparisons. If the population of Indiana myotis increases in Bat Cave, then biologists will have a good indication that Indiana myotis populations are increasing in our state.

Bats comprise an unusually diverse group. About one in every four mammal species is a bat. Most bats are active only during dusk and night, using a kind of sonar called echolocation to find their way in the dark and capture tiny flying insects. Most bats that eat insects scoop their prey into their tail or wing and then grab them with their teeth. A single bat can eat thousands of insects every night.

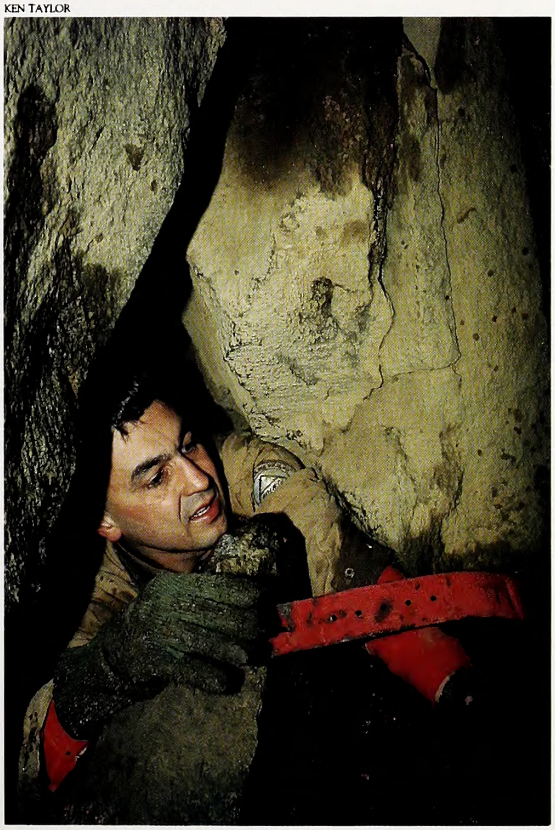
Most bats have only one young each year (called pups), though several species have up to four young. Pups are born in May and June and start to fly within several weeks of birth. Some may live, if they are lucky, for 30 years. North Carolina's bats either hibernate or migrate during cold winter months when insect prey is scarce. Some bats like the silver-haired bat and the big-brown bat are fairly hardy, however, and may surprise you by flitting past on a warm winter evening.

Bats sometimes get into houses and become pests (See "Bats in Your Belfry?"). Most bat colonies found in houses in the mountains are made up of big brown bats. These bats are rather large with a wingspan of better than 12 inches. Our two rare big-eared bats are nearly as large, each with wingspans better than 11 inches. Only one of the bats, the Rafinesque's big-eared bat, forms colonies in houses. The small-footed myotis and the long-eared myotis may form colonies in small cracks between your porch and house, or under shingles or behind shutters. The little brown myotis will do the same. *Myotis* bats are very difficult to tell apart. One characteristic of *Myotis* bats is that they are small. These three *Myotis* species have wingspans of 10 inches or less.

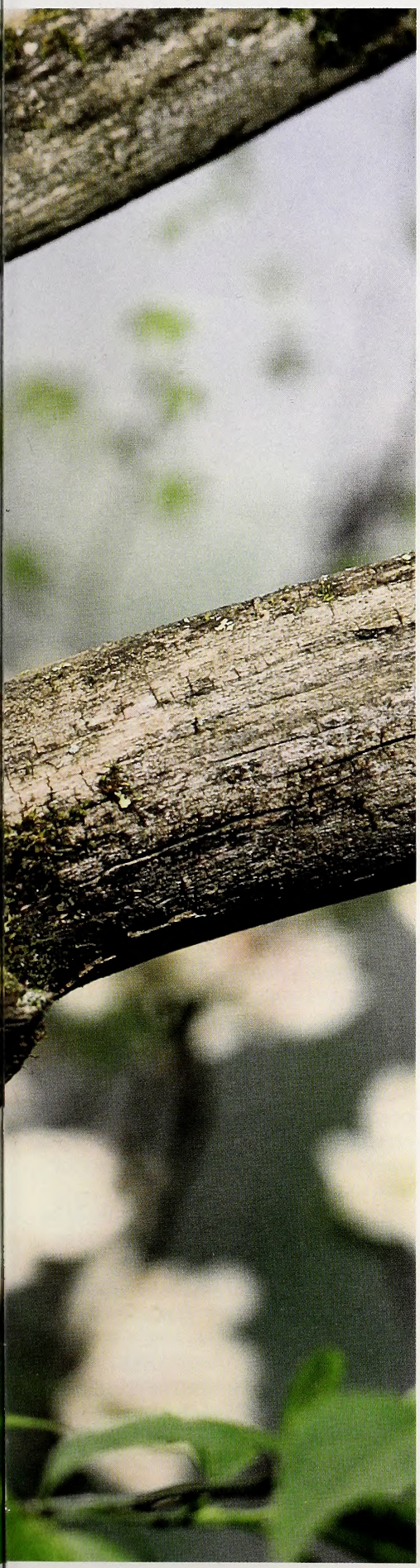
Although Federal funding for the Commission's rare bat survey in the mountains has run out, our wildlife biologists still want to find new colonies of unusual species. If you know the location of a colony of rare mountain bats, contact your local wildlife biologist. Your report may help save the habitat of one of our more fascinating mammals—the only mammal capable of flight.

JAMES F. PARNELL

KEN TAYLOR



The uncommon *Rafinesque's big-eared bat* (Plecotus rafinesquii) *is found at the coast and in the mountains, but not in the Piedmont. Finding and counting North Carolina's bats are not tasks for the claustrophobic, as nongame biologist Allen Boynton (below) can attest.*



Late Night LOUDMOUTH

An insomniac's nightmare, the whippoorwill has been called everything from a goatsucker to a shady character. But there's more to this bird than bad names.

written by Joel Vance © 1993
photographed by Steve Maslowski © 1993

It's the most familiar bird you never saw. Its call is incessant and insistent. To some it is the voice of the night; to others it is like Chinese water torture. Perhaps no bird is more recognizable by sound to rural North Carolina insomniacs than the whippoorwill and its cousin, the chuck-will's-widow. And they do talk! Naturalist John Burroughs once counted 1,088 continuous calls by a whip-poorwill, then 390 more after the bird paused for an instant (maybe for artificial respiration). Ornithologist Alexander Sprunt Jr. counted 834 continuous calls by a chuck-will's-widow, a close kin to the whippoorwill that is also likely to be heard by North Carolinians. On June 2, 1983, bird enthusiast Pete Laurie of Johns Island, S. C., counted 2,616 calls between 2:45 a.m. and 4:19 a.m. with a brief pause of 2 to 3 seconds every 25 to 100 calls.

Whippoorwills are one member of a family inelegantly called "goatsuckers." The Latin family name is *Caprimulgidae*, from the Latin word for "milker of goats." Ancient tradition said the birds sucked milk from goats and caused the animals to go blind (which is, to voice an irresistible pun, udderly ridiculous). Chances are, the birds were hunting flying insects around the bellies of goats. Even Aristotle repeated the goatsucker nonsense. One ornithologist, a whippoorwill enthusiast, wrote that an adult whippoorwill probably catches more mosquitoes in a single night's feeding than the average purple martin does in its lifetime.

***Though quite common** in North Carolina, the whippoorwill is more often heard than seen, and its camouflage is nearly perfect when it's sitting on a log, fence rail or the ground. This male whippoorwill has chosen a limb from which it will deliver a spring evening's nearly incessant chorus.*

The United States' members of the family include the chuck-will's-widow, poor-will, common and lesser nighthawk, and pauraque (in all, there are 67 family members world-wide).

Whippoorwills (or whip-poor-wills, as some spell it) and chuck-will's-widows are common in the southeast United States. The poor-will's range is the western half of the country, the pauraque inhabits southern Texas, and the nighthawk—also called bull-bat—is universal, ranging over all of Canada, the United States and Mexico.

The poor-will is the only bird known to hibernate. In 1946, Edmund Jaegar found a hibernating poor-will in California's Chuck-walla Mountains. The bird had no detectable heartbeat and a temperature of 42 degrees below normal.

The chuck-will's-widow is the largest of the American goatsuckers, a foot long (its Western cousin, the poor-will, is smallest at 7 inches) and has been known to inhale small birds, as well as large insects such as moths and June bugs. If it flies, it dies, is Chuck's motto.

The camouflage of whippoorwills is near-perfect. The mottled browns are the exact pattern of leaves on the forest floor. The bird doesn't build a nest and lays its two white eggs almost always on a dead leaf forest floor in fairly open woods. The male struts before the female, uttering guttural "chucks" during mating season, which in the Carolinas is from late April on, depending on location. If a predator gets the eggs, the female will re-nest. One ornithologist speculated the birds return to the same spot to nest since he'd found nests in the same place in successive years. But he admitted that only banded birds would verify his theory.

Nighthawks prefer the flat roofs of buildings, particularly those with gravel coverings. A female will defend her nest ferociously,

***The common nighthawk** is close kin to the whippoorwill and is often seen soaring over rooftops and other well-lit areas in towns and cities. Baseball parks are favorite hunting spots because the lights attract insects.*

hissing like a snake, and (in common with the other goatsuckers) will use the "broken wing" trick to lure intruders away from nest or chicks.

Whippoorwill chicks are precocious; they can move within a couple of days of hatching and can fly before they're three weeks old. They're protected until then by a yellowish color that blends with fallen leaves.

Much of a whippoorwill's natural history is shrouded by night and camouflage. The most obvious characteristic is its call, and whip-poorwills do have a way of getting under your skin if you become conscious of the incessant repetitions.

Ornithologists are fond of translating bird calls into English: the meadowlark allegedly is calling, "Spring is here!" even in August. One bird enthusiast translated the chuck-will's-widow call as, "Chip fell out a white oak!" and another heard it as, "Twixt hell and white oak!" which indicates perhaps those people had listened to entirely too many night calls.

The call of the whippoorwill and chuck-will's-widow is the same, if you break it down, but the emphasis is in different places. The whippoorwill emphasizes "will;" the chuck-will's-widow "wid."

Elliott Coues, among history's most famous ornithologists, said the whippoorwill is "a shady character, more often heard than seen, of recluse nocturnal habits and perfectly noiseless flight, in the breeding season ceaseless in uttering with startling vehemence its uncouth cries." Coues waxed a bit more poetic at another time: "...those scarce-embodied voices of the night, here, there, and everywhere unseen, but shrilling on the ear with sorrow-stricken iteration."

Henry Thoreau cherished the birds: "The note of the whip-poor-will, borne over the fields, is the voice with which the woods and moonlight woo me." Thoreau wrote about goatsuckers fairly frequently and sometimes with a bit of awe. He found a nighthawk on its nest and said it looked "so one with the earth, so sphinx-like." If you've ever seen a goat-sucker either perching or on a nest, the sphinx reference seems ideal. The birds close their eyelids and are totally motionless, like a bit of exotic sculpture.

Coues may have regarded the whippoor-will's call as coarse, but to some Indians it was a cause for concern. The Omaha Indians

Whippoorwills most often nest *rather casually on the ground. This female guards eggs she laid among dry leaves on the ground.*

believed if you heard the call, which they felt was a question of some sort, and answered "no" and the bird ceased to call, you were doomed to die. Of course, someone who goes around shouting "No!" at bird questions likely doesn't have a very bright future anyway. A pioneer legend said that if an unmarried woman heard the first whippoorwill call of spring, then did not hear a second, she was fated to remain unmarried for a year. If the bird continued after the second call, she would be a spinster, but she could forestall that fate by making a wish to be wedded on the first call. Considering how quickly whippoorwills call, a bachelorette had to be nimble with her wishes.

The Utes of Colorado thought the whippoorwill was a night god and could transform a frog into the moon. The Iroquois theorized that ladyslippers—*Cypripedium*—were whippoorwill shoes.

Another legend was that you could cure a bad back by turning somersaults in time to a whippoorwill's calls (you'd think that would more likely cause a bad back than cure one).

Whippoorwills and chuck-will's-widows rarely venture out before dark. Night drivers on gravel roads often are startled by the red glare of eyeballs in the headlights, like a bird from Hell. It is the whippoorwill. Nighthawks are the more visible. They often feed in evening light and are especially noticeable in the fall when they migrate south in sizeable flights.

Whippoorwills are relatively unafraid, and most turkey hunters, perched on a log waiting for the sun to come up, have had whippoorwills land within a few feet of them or on the same log. Whippoorwills have a few natural enemies, which may be one reason they have a low birthrate—two chicks per hatch. No need to breed more, else we'd be inundated by whippoorwills.

The whippoorwill perches lengthwise on tree limbs or on the ground, rather than crossways as other perching birds do, and a resting whippoorwill is virtually impossible to see—you'd pass within inches, thinking it was a bump on a log. There is nothing to give the bird away. Its mottled feathering blends perfectly with its woody background and it closes its eyes, so there isn't even the gleam of an eyeball to give it away.

A whippoorwill can fly through the night woods without hitting anything, so obviously the bird has superb night vision. Much of its feeding is done in twilight, but the birds also flit through the forest on moonless nights. Their flight is soundless—like owls, they have soft, frayed feathering that makes no noise.

Both whippoorwills and chuck-will's-widows have "rictal bristles" protruding forward from their mouths. Some experts think that increases the size of the bird's insect trap (goatsuckers fly with their mouths open), while others think the bristles serve as a bug deflector. Nighthawks, however, don't have the rictal bristles.

Country singers have resorted to whippoorwills for inspiration. Both Bradley Kincaid and the duo of Lulu Belle and Scotty advised their lover to meet them when the first whippoorwill calls (if the tryst continues until the final call, it's gonna be a long night).

The whippoorwill has been with us through recorded history, in fable and fact, and perhaps always will be. To some, its song is a lullaby, to others, fingernails on a blackboard. But those who consider the first robin or bluebird the official harbinger of spring are overlooking the fact that a whippoorwill was no doubt sounding the news throughout the long night before. ☐

Joel Vance is the author of two humor collections, Grandma and the Buck Deer *($17) and* Confessions of an Outdoor Maladroit *($22) available postpaid and autographed from Cedar Glade Press, Box 1664, Jefferson City, MO 65102.*

A Passion for Photography

While hosts of excellent nature photographers are at work today, few have Derrick Hamrick's determination to succeed.

photographed by Derrick Hamrick© 1993

This jumping Fowler's toad *was frozen by the photographer's high-speed flashes and his 105mm macro lens. Hamrick knows that during the mating season in spring and early summer, the toads virtually ignore a photographer's presence.*

While afield, nature photographer Derrick Hamrick has had more than his share of bad luck. He has dropped cameras and lenses from trees, had electronic flashes short out on him and expensive backdrops ruined by humidity. Once his camping equipment was stolen by thieves; another time a 5-inch gullywasher collapsed his tent and soaked his sleeping bag while he was out photographing. He has lost the transmission of his car when it hit a deep hole on a rutted dirt road. His axle joints have given out. Bark has showered him from a tree hit by lightning 10 feet away.

"I may not be the luckiest man in the world," he says, "but I'm one of the most persistent."

To this Raleigh fire-fighter smitten by the magic of photography, persistence, tenacity and inner strength are the keys to producing great photographs. "I never give up, I never lose sight of my goal," he says. "I don't care how long it takes."

In one case, it took nearly three years. His photograph of the baby red-cockaded woodpecker fledging from its cavity (opposite page) was an image that he visualized long before he could get it. He put 20,000 miles on his car, weekends and holidays, driving to Francis Marion National Forest in South Carolina trying to capture the instant of a bird's maiden flight. On one occasion, he dragged a downed pine tree the size of a telephone pole to a hole 3 1/2-feet deep for a tree blind. He moved mobile photographic blinds a few feet at a time over two days to photograph close up without spooking the parents. Several times birds fledged before he could get close enough to shoot.

"Many times I drove to Francis Marion for a day, five hours each way, because I had to be at work the next day," Hamrick says. "I knew if I didn't go down there the chance of a woodpecker being fledged was good." Twice, the birds had already fledged. Finally, after two seasons of disappointment, he got the picture he wanted.

Ethically, Hamrick plays by the rules—his first thought is for the safety of the animal that he's photographing. But during his two-year wait for the fledging red-cockaded woodpecker, wasn't he ever tempted to set up his blind without the two-day approach?

"It's better to sacrifice a photograph than to endanger the life of an animal," he says. "I feel very strongly about that. There are a lot of hardships in wildlife photography. A lot of people think that to get a picture you just go out in the woods with your camera. It just doesn't happen that way.

"You can go out with your camera and just happen to get a great shot," he says. "But planning makes your photography a lot more efficient. The night before I go out, I think about what I want so the next morning I know exactly what I'm going to get."

Hamrick finds one of his greatest planning aides is the all-day Weather Channel. Watching the forecast the night before a shoot, he looks for favorable weather conditions. He knows that humidity rising to 100 percent on a clear spring morning will produce dew-covered wildflowers. Combined with low wind, those are perfect conditions for close-up flower photography and the long exposures he needs.

"Nature is hard to predict," he says, "but I can use my skills and knowledge, and rely on the knowledge of other skilled people like the Weather Service, to get what I want."

Hamrick uses Nikon cameras and lenses from the ultra wide-angle 18mm to the 500mm telephoto. His most versatile lens is the 500 because it can bring forward distant animals or a piece of a distant landscape, and, with an extension tube, can take a close-up of a wildflower.

Among Hamrick's current photographic subjects are barn owls, gray squirrels and river otters. More and more he's using high-speed flashes to stop moving subjects in startling detail. In his mind's eye he's already seen the picture he'll finally get of a river otter hitting the water after sliding down its mud slide.

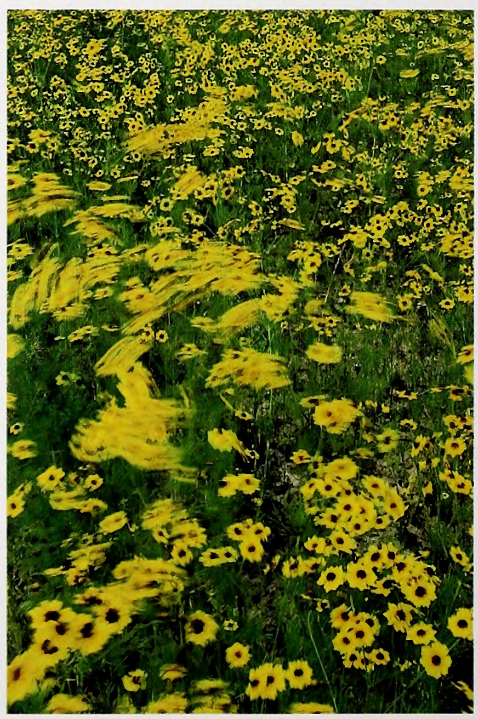
Hamrick has had a lot of failures, he admits. And he's sacrificed friends and relationships to his photographic passion. "I'm unattached because nobody's going to put up with someone who spends so much time on photography," he says. "But that's the price I have to pay. If you have a dream, you have to visualize it just like you do a photograph. I think that's what it takes to be successful."

—Lawrence S. Earley

The maiden flight *of this 26-day-old red-cockaded woodpecker chick (left) was captured by Hamrick's high-speed flash. The bird's leg has an identification band that was attached by biologists when it was four or five days old. The red feathers show that the bird is a male. A rainstorm stopped neither the ruby-throated hummingbird feeding at the trumpet creeper (below) nor the photographer. Hamrick says that hummingbirds love to feed in the rain. Both photographs were taken with the 500mm telephoto lens.*

Wanting to eliminate *the unsightly rip-rap at the base of the Cape Hatteras Lighthouse (above) from his photograph, the photographer used a 24mm wide-angle lens at a low angle and had a friend throw bread crumbs to attract the ring-billed gulls. Back-lighting dramatically enhanced this photograph of an American egret (right) with a shrimp in late afternoon.*

Hamrick passed up *an opportunity to shoot these dead trees on a sunny afternoon and waited to photograph them on a morning eerie with fog. He knows that cool fall nights after warm days will often produce fog. This scene was shot at Falls Lake near Raleigh using a 200mm telephoto lens.*



Photographing the mayapple *leaf and tiny rue-anemone (above) required a 105mm macro lens, a tripod and patience. Even the slightest breeze will make the flowers dance. Sometimes movement can be surprisingly effective, as this photo of a field of coreopsis attests (right). Since the wind wouldn't let up, Hamrick exposed the picture at a slow shutter speed (½ second). The photo captures the feel of a field of flowers on a windy day.*

To photograph the mating *embrace of two American toads (left), Hamrick lay on his belly in a swamp. He used a 105mm macro lens. The embrace stimulates the female to lay her eggs which are fertilized in the water by the male. A low angle also made this photograph of an Eastern box turtle more effective (below). While watching out for cottonmouths at Merchant's Mill Pond, Hamrick shot the turtle using a 500mm telephoto lens.*

Materials May be Mail-Ordered

Wildlife Commission Launches New Educational Publications

Written and Edited by Vic Venters

For more than 50 years, *Wildlife in North Carolina* has been educating Tar Heels about wildlife, its management and the conservation of our natural resources. During the past decade, *North Carolina WILD Notebook* has provided educators environmental-education supplements eight times a year for use in school classrooms.

Now these award-winning publications are getting some help—from new educational materials aimed at teachers, school children and parents. The new effort can be seen for the first time this month on page 32 in *Wildlife in North Carolina* where these materials are described and an order form is displayed.

Most of these new materials, and others soon to join them, are aimed at supplementing the Wildlife Commission's popular N.C. WILD teacher workshops.

"N.C. WILD is playing an important role in educating our youth about the natural world around them," says A. Sidney Baynes, chief of the Division of Conservation Education. "In addition to the workshops, we've found that our teachers need educational materials specific to North Carolina's wildlife and natural habitats."

Teachers and parents of school children consistently ask for more information on North Carolina's wildlife. To answer these requests, the division is producing sets of fact sheets on familiar and unfamiliar animals found in North Carolina. These "WILDlife Profiles" consist of single-sheet descriptions of wildlife species, each one detailing the habits and habitats of an animal, as well as its history, status and distribution in the state. A range map and illustrations of the animal and its tracks round out each profile.

Twenty profiles have been completed, with 20 more scheduled for publication this spring.

A video and teacher's guide package has also drawn a lot of interest from teachers. "All Things Are Connected" is a 12-minute video that uses a version of the celebrated speech of Chief Seattle, a 19th-century West Coast Native American, to introduce concepts of environmental ethics. The accompanying teacher's guide explores the beliefs and attitudes held by Native Americans toward the land and its creatures.

Upcoming publications for early 1993 include a full-color poster of North Carolina lizards and a 100-page book, *North Carolina WILD Places: A Closer Look*.

The lizard poster is part of a series of five posters on the state's amphibians and reptiles that will be produced one per year. A cooperative project with the N.C. Herpetological Society, the posters will display photographs of each of the state's herps along with information highlights on each species.

Three years in the making, *North Carolina WILD Places: A Closer Look* is a delightfully illustrated primer in ecology as well as the only publication for general readers that describes and illustrates North Carolina's major natural habitats.

The WILD Places project also includes a teacher's guide and three color posters. One of them is an illustrated color map of North Carolina habitats. Books and posters will be available in early spring; the teacher's guide is scheduled for publication next fall. A limited-edition art print of the map will also be available.

Although these educational materials won't be free to the general public, they are attractively priced, adds Baynes. "Proceeds from the sale of these items will support the development and production of additional materials as well as underwrite the expense of providing free materials to schools, museums and other educational institutions. That way, we can continue to provide high-quality educational products to teach our children about wildlife and the need for conservation."

—Lawrence S. Earley

Artist, Companies Donate Work

Print Benefits Environmental Education

***Proceeds from the sale of** "Feeling Lazy" by Robert Flowers will be donated to benefit N.C. WILD, the Wildlife Commission's environmental education program.*

When you buy a limited-edition art print of "Feeling Lazy" by Robert Flowers, you'll be investing in much more than just another pretty picture. All proceeds from the sales of these donated prints will be used to support N.C. WILD, the Wildlife Commission's environmental-education program.

"There is a big need for conservation-oriented educational workshops, as well as for associated materials, and these funds will go toward producing these items," said A. Sidney Baynes, chief of the Wildlife Commission's Division of Conservation Education. "We greatly appreciate Robert Flowers and all the people and companies who have made this project possible."

In addition to donating the image, Robert Flowers arranged donations to cover the production expenses. The following companies and people deserve special thanks: Media Press, Inc. of Greensboro for donating printing and press work; Hi Ke Color of Greensboro for donating color separations; Henley Paper Co. of Greensboro for donating the paper; and Mr. and Mrs. Jerry Steffey of Charlotte for allowing the use of the original artwork of "Feeling Lazy."

For information on how to order the print, see the insert order form opposite page 32.

Seven Tar Heels in Hall of Fame

Bird Dog Museum in Tennessee Honors North Carolinians

A host of North Carolinians have been honored in the Field Trial Hall of Fame at the National Bird Dog Museum in Grand Junction, Tenn. The new museum, which opened in February 1991, celebrates the 40 dog breeds used to hunt birds. Its exhibits feature an assortment of portraits, photographs, art and memorabilia of bird dogs encompassing all the pointing, retrieving and spaniel breeds.

The North Carolinians who have been honored by election to the museum's Field Trial Hall of Fame include brothers Louis and Bracey Bobbitt, Frederick E. Bevan, Paul Walker, Dr. T. W. Shore and Dr. William H. McCall. The Hall of Fame honors people or dogs that have contributed significantly to the sport. Dr. McCall currently serves on the N.C. Wildlife Resources Commission, and was instrumental in establishing the noted field trial grounds at the Sand Hills Game Lands at Hoffman.

In addition to the Hall of Fame and its many exhibits, the Bird Dog Museum also includes a library containing rare books and periodicals. The museum's Wildlife Heritage Center is the educational arm whose goal is to educate the public about the importance of wildlife conservation and the benefits derived from ethical sport hunting.

Grand Junction is considered a mecca for sporting dog fanciers, with some of the South's most prestigious field trials held in the area. The museum, and its non-profit foundation, have been widely supported by various national bird dog associations and clubs.

For more information, contact The Bird Dog Foundation, P.O. Box 774, Grand Junction, TN 38039, or call (901) 764-2058.

***The new National Bird Dog Museum** in Grand Junction, Tenn., opened last February. Six North Carolinians have so far been included in the museum's Field Trial Hall of Fame.*

March 5-7

Dixie Deer Classic on the Way

The 13th annual Dixie Deer Classic will be held March 5 to 7 at the Jim Graham building on the North Carolina State Fairgrounds in Raleigh.

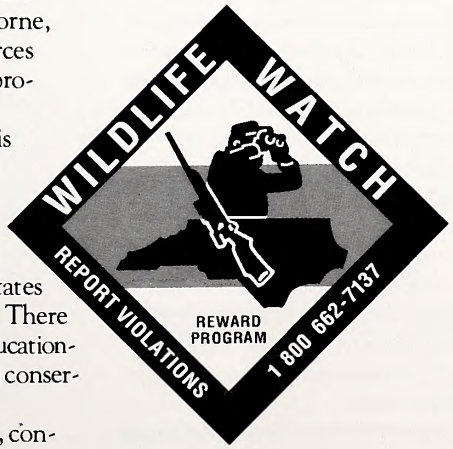
The exposition event has become one of the most popular hunting shows in the nation; last year, for instance, over 17,000 three-day passes were sold.

As usual, the show will feature displays and retail booths for hunting equipment, outfitters, guides and taxidermists, as well as trophy scoring according to Boone and Crockett Club standards. Awards will be granted in several trophy categories.

Also featured will be seminars by experts such as Dick Idol, hunting expert and writer for *North American Whitetail* magazine; Myles Keller, expert bow hunter; Gary Sefton, expert on deer vocalization and calling; Roger Raglin, hunting video producer; and Scott Osborne, the N.C. Wildlife Resources Commission's big game project leader.

A special exhibit at this year's Classic will be the World Record Replicas Collection featuring 15 of the No. 1 white-tailed deer heads from various states and Canadian provinces. There will also be exhibits and educational displays from numerous conservation groups.

For more information, contact the show sponsors at Wake County Wildlife Club, c/o The Dixie Deer Classic, P.O. Box 12202, Raleigh, N.C. 27605, or call (919) 782-5333.



Calendar

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event.

Feb. 12-14

The Southeastern Wildlife Festival in Charleston, S.C., will feature over 500 exhibitors and $20 million in original wildlife art and collectibles. For more information, contact the Southeastern Wildlife Exposition, 211 Meeting Street, Charleston, S.C. 29401, or call 1-800-221-5273.

Feb. 20-21

The second annual Coastal Carolina Wildlife Exposition will be held at the Coastline Convention Center in Wilmington and will feature paintings, sculptures, decoys and educational displays. A special decoy display by the Carolina Decoy Collector's and Carver's Association will also be featured. For more information, contact the Greater Wilmington Chamber of Commerce, 505 Nutt Street, Wilmington, N.C. 28401, or call (919) 762-2611.

Support the Nongame Fund

Don't forget to make a donation to the state's Nongame and Endangered Wildlife Fund this year. Since 1983, North Carolina residents may check a line on their state income tax form and designate any or all of their refund to the Nongame Fund. The money is used by the N. C. Wildlife Resources Commission to manage and protect wildlife species that are threatened, endangered or rare—such as eagles, peregrine falcons, shorebirds, freshwater mussels and northern flying squirrels.

Heritage Foundation Reorganized

Land Conservation Trust Formed

This fall, the N.C. Natural Heritage Foundation was reorganized and renamed to become the Conservation Trust for North Carolina. One of its main goals will be to work in cooperation and partnership with local land trusts, communities and private landowners.

During the 1980s, one of the fastest growing segments of the conservation movement has been creation of local land trusts. The goal of most of these trusts or groups—of which there are already more than 20 in North Carolina—is to protect local lands of natural or cultural importance that may be overlooked by larger national or statewide conservation groups.

"Up until now, no one has been serving the needs of the local trusts," said Chuck Roe, former manager of the state's Natural Heritage Program and now executive director for the Conservation Trust. "A large part of our mission will be to help train people to run trusts, develop conservation strategies for them, coordinate efforts between groups, and act as an umbrella to form coalitions. We'd like to foster the creation of these new groups where local conservation efforts are needed."

In partnership with the N.C. Institute for Government and others, the Conservation Trust will be providing training assistance and workshops on a variety of land conservation topics. They will also be helping public agencies and citizen groups with conservation land planning.

Another focus for the trust will be helping private landowners design and develop conservation-management plans for their land. In addition, the Conservation Trust will hold conservation easements and other interests in land until the properties can be transferred to local land trusts or public agencies.

For more information about the program, contact Chuck Roe, Conservation Trust for North Carolina, P.O. Box 33333, Raleigh, N.C. 27636, or call (919) 828-4199.

Hunting Deaths Decline

A single hunting-related death is one too many in any state, but Tar Heel hunters have to be pleased with the decline of hunting accidents in recent years.

Five hunters died in 42 accidents during the 1991-92 season. Five deaths is the lowest number of deaths recorded in a single season since the N.C. Wildlife Resources Commission began keeping records in the 1960-61 season.

The highest accidental death count ever among North Carolina hunters came in the 1964-65 season, when 19 deaths were reported.

In the five hunting-related deaths, four of the hunters were wearing blaze orange. However, two of those deaths were by self-inflicted wounds. The other three were shot by others at ranges of 10 yards to more than 100 yards.

North Carolina began its hunter education program in 1971-72. In that year, 324 students successfully completed the course. During the 1991-92 reporting period, a total of 31,932 students enrolled and 29,365 successfully completed the course.

The highest number of students to be involved in the program in any year was 33,303 enrolling in 1983-84, with 28,705 successfully completing the course.

—Bodie McDowell

Book Review

On Point: Tales of Quail and More

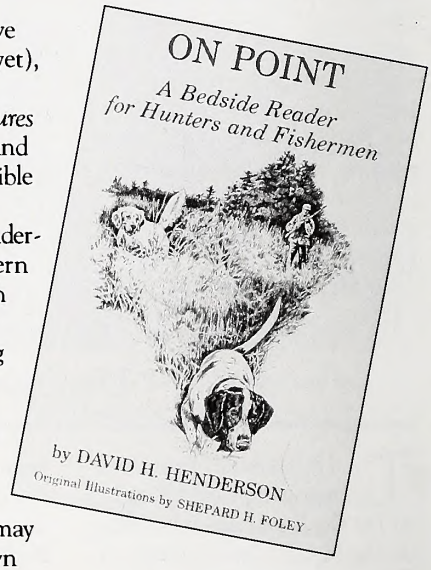
On Point by David H. Henderson, illustrated by Shepard H. Foley. Published by New Win Publishing Inc., P.O. Box 5159, Clinton, N.J. 08809. Hardcover, black & white illustration, 328 pages, 1992, $17.95.

On Point, a collection of 54 short stories and essays, is David Henderson's third book and it may be his best. Most of the essays range over Henderson's first love, bird hunting and bird dogs, but he also reflects on experiences and observations gleened from 50-plus years tramping through the outdoors of North Carolina and the Southeast.

Many readers may not have heard of David Henderson (yet), but his previous two books, *Covey Rises and Other Pleasures* and *Sundown Covey*, command healthy prices on the collectible sporting books market.

An attorney by trade, Henderson writes like a good Southern lawyer talks: directly yet with eloquence and with a storyteller's eye and ear for timing and detail. His best material focuses on the traditions of what may be a dying breed in the South: the brush-busting, foot-slogging quail hunter. This type of hunter may be rich, may be poor, may own land, may not, but all share an appreciation of good bird dogs and that finest of game birds, the bobwhite quail. (See "Hunting With Herbert" in this issue.) His natural history musings are no slouches either; the essay "The Raptors" is especially well-written and welcome in this day when hawks and owls are still seen by many bird hunters as little more than vermin.

The book is nicely illustrated with the subtle pen and ink drawings by Henderson's daughter, Shepard H. Foley. In all, *On Point* is well worth a fireside visit when the dogs are up and the guns are cleaned.



Field Notes

Rabbit	Closes Feb. 27
Bobwhite Quail	Closes Feb. 27
Ruffed Grouse	Closes Feb. 27
Snipe	Closes Feb. 27
Snow and Blue Geese	Closes Feb. 10

Information on bag limits and other regulations may be found in the *1992-93 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest*. For a copy, check with license agents or contact the N.C. Wildlife Resources Commission, 512 N. Salisbury Street, Raleigh, N.C. 27604-1188.

Don't Feed Raccoons

Rabies Spreading Across State

Chances of Tar Heels being bitten by rabid animals are becoming more common as rabies is moving into North Carolina from three different directions, reports Dr. Lee Hunter, public health veterinarian for the N.C. Department of Environment, Health and Natural Resources.

In western North Carolina, an epidemic has moved into the northwestern counties of Alleghany and Watauga from Tennessee. Additionally, the rabies virus has crossed the state line from South Carolina into Mecklenburg and Union counties from South Carolina.

At least seven counties have been affected by the mid-Atlantic outbreak as it moved in from Virginia. These counties are Gates, Pasquotank, Perquimans, Chowan, Northampton, Halifax and Durham. The disease is expected to spread.

Although rabies has been found predominantly in the fox and raccoon populations in North Carolina, it is a disease transmittable by all warm-blooded animals. Treatment for rabies is painful and expensive, and all precautions should be taken so that one is not exposed to a rabid animal.

"The public should be concerned with any animal that doesn't act normal," said Randy Wilson, section manager for the N.C. Wildlife Resources Commission's nongame and endangered wildlife program. "You should never attempt to touch any animal—wild or pet—that is acting strangely. Pet owners should also make sure all pets are vaccinated against rabies and vaccinations are up to date. Don't feed raccoons and don't let raccoons feed from pet food bowls."

—*Bodie McDowell*

Wildlife Endowment Fund Report

November 1992

Principal Balance
$17,669,596.30
Interest Earned
$10,553,564.59
Total Receipts
$28,223,160.89
Interest Used
$4,123,817.48
Fund Balance
$24,099,343.41

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

The 1993 North Carolina Wildlife Calendar Is Here!

With such artwork *as Joe Seme's "Ward Brothers Canvasbacks" featured above, the North Carolina Wildlife Calendar is sure to sell out again this year.*

The works of Robert C. Flowers, Jr., Brooks Pearce, David E. Doss, Robert B. Dance, Bob Herr, Duane Raver, Mel Steele, James A. Brooks, Joe Seme, and Dempsey Essick are featured in the 1993 Wildlife Calendar. Order yours today by returning the form below with your check or money order to 1993 Calendar, N.C. Wildlife Resources Commission, 512 N. Salisbury Street, Raleigh, N.C. 27604-1188.

ORDER TODAY!

Please send me ..... N.C. Wildlife Calendars at $6.00 each $_____
All N.C. residents add $.36 sales tax per calendar _____
No sales tax for out of state residents.
Enclosed is my check for ..... Total $_____
If ordering 7 or more calendars, please provide your UPS deliverable address.

Name _____
Address _____ Apt. # ____
City/State/Zip _____
Phone (_____) _____

Send order to: 1993 CALENDAR; N.C. Wildlife Resources Commission;
512 N. Salisbury Street; Raleigh, N.C. 27604-1188
Office located at: 322 Chapanoke Rd., Raleigh N.C. 27603
All orders must be prepaid. We do not bill. A $20.00 charge will be made on returned checks (N.C.G.S. 25-3-512).
For fund raising and bulk rate information (10 calendars or more), call 919-662-4377. Please allow 6 weeks for delivery.

CALO93

Foolproof Food Plots

by Vic Venters

February is traditionally the time when landowners interested in managing for small game begin thinking about planting food plots. If you're planning on doing this, you should obtain a copy of the N. C. Wildlife Resources Commission's latest brochure, *Planting Food Plots For Small Game*, before proceeding. The booklet details guidelines for managing your small game habitat with advice based on the latest biological research.

Recent studies indicate that unless food plots are properly sited in adequate cover, this traditional habitat management practice is rarely the key for improving small game wildlife populations. More often than not, small game populations on today's farms are limited by a lack of adequate breeding and winter escape cover, rather than a shortage of food. When planted in conjunction with adequate habitat, food plots can still be helpful to small game by providing food in cold weather. However, if they are the landowner's only management practice, they can actually do more harm than good by concentrating small game for excessive predation, especially when located in poor cover.

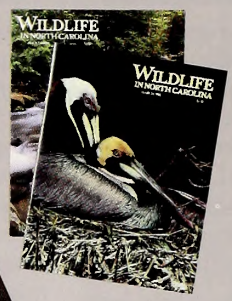
Until this year, the Wildlife Commission handed out free packets of annual food plot seeding mixture. This year, however, that practice has been terminated and the Commission is instead conducting 18 seminars, beginning this month, to educate landowners on a wide variety of habitat improvement techniques for small game, big game, waterfowl, turkey and other wildlife species.

The emphasis of the small game seminars will be to stress the importance of *extensive* habitat management such as providing nesting cover by prescribed burning and fallow field management, rather than narrowly focused *intensive* management practices such as individual food plots. There will be a small fee for some of the seminars. At certain seminars, meals and refreshments will be provided.

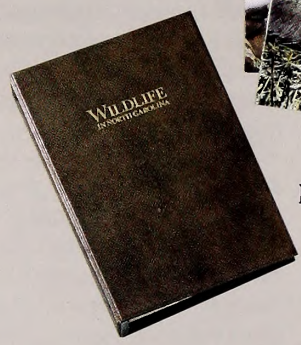
For more information on small-game management seminars or for a free copy of the brochure, contact the Division of Wildlife Management, 512 N. Salisbury St., Raleigh, N.C. 27604-1188.

The N.C. *Wild* Store

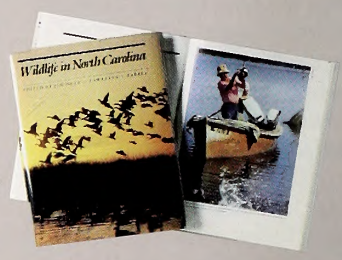
Take advantage of these great items and you'll support conservation education throughout North Carolina. Proceeds from the sale of these publications will support the development and production of educational projects and programs.



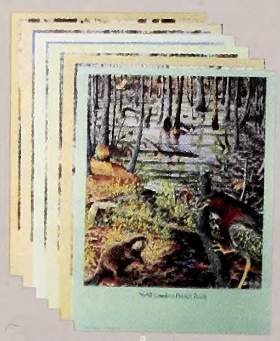
WILDLIFE IN NORTH CAROLINA MAGAZINE



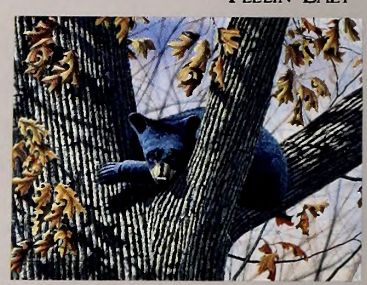
M2. WILDLIFE IN NORTH CAROLINA MAGAZINE BINDER



M3. WILDLIFE IN NORTH CAROLINA BOOK



P1-P2. N.C. WILD ART PRINT "FEELIN' LAZY"



N1-N5. WILDLIFE HABITAT ART PRINTS

W1. ALL THINGS ARE CONNECTED (VIDEO)
W2. THIS LAND IS SACRED (TEACHER'S GUIDE)
W3. ALL THINGS ARE CONNECTED & THIS LAND IS SACRED

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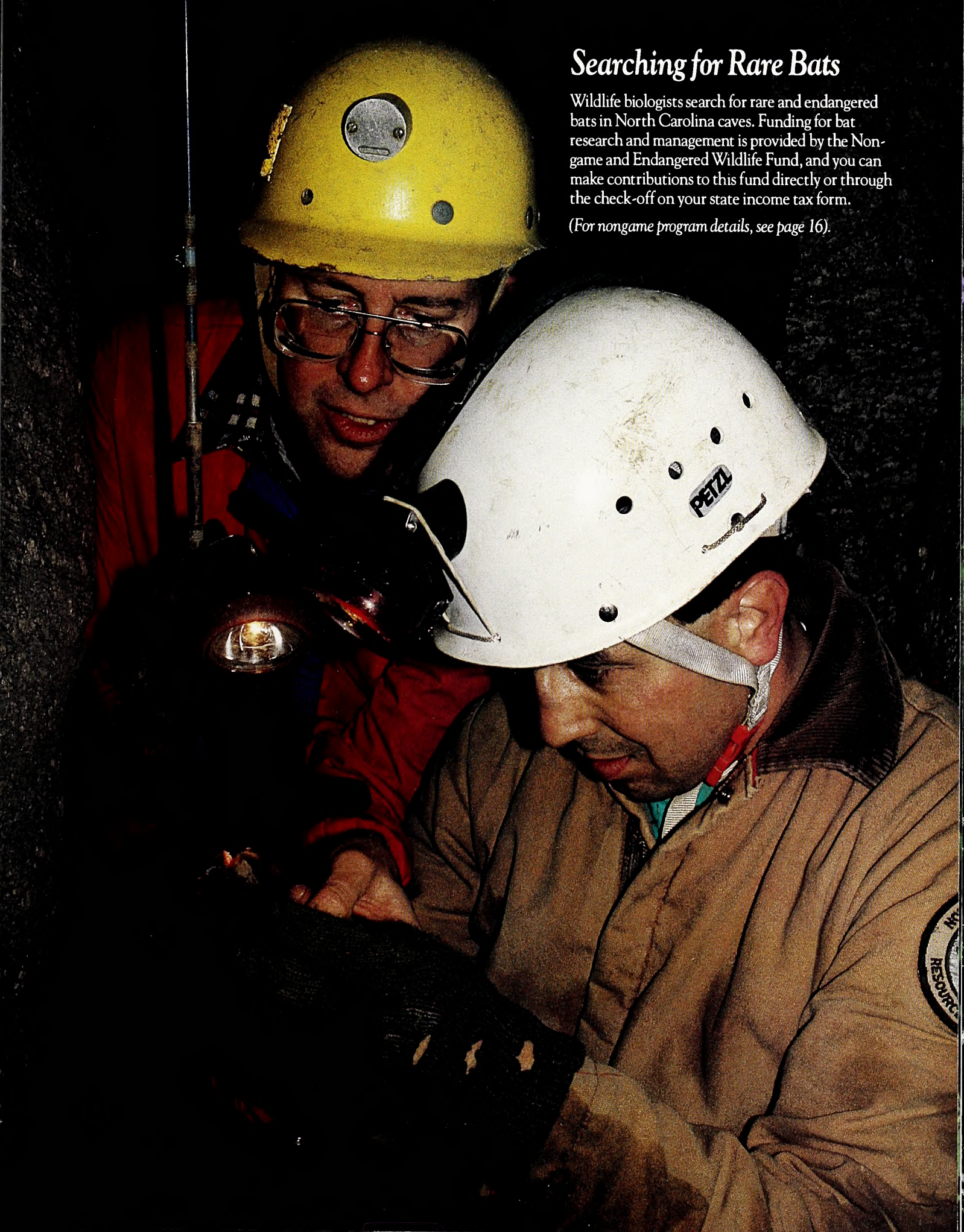

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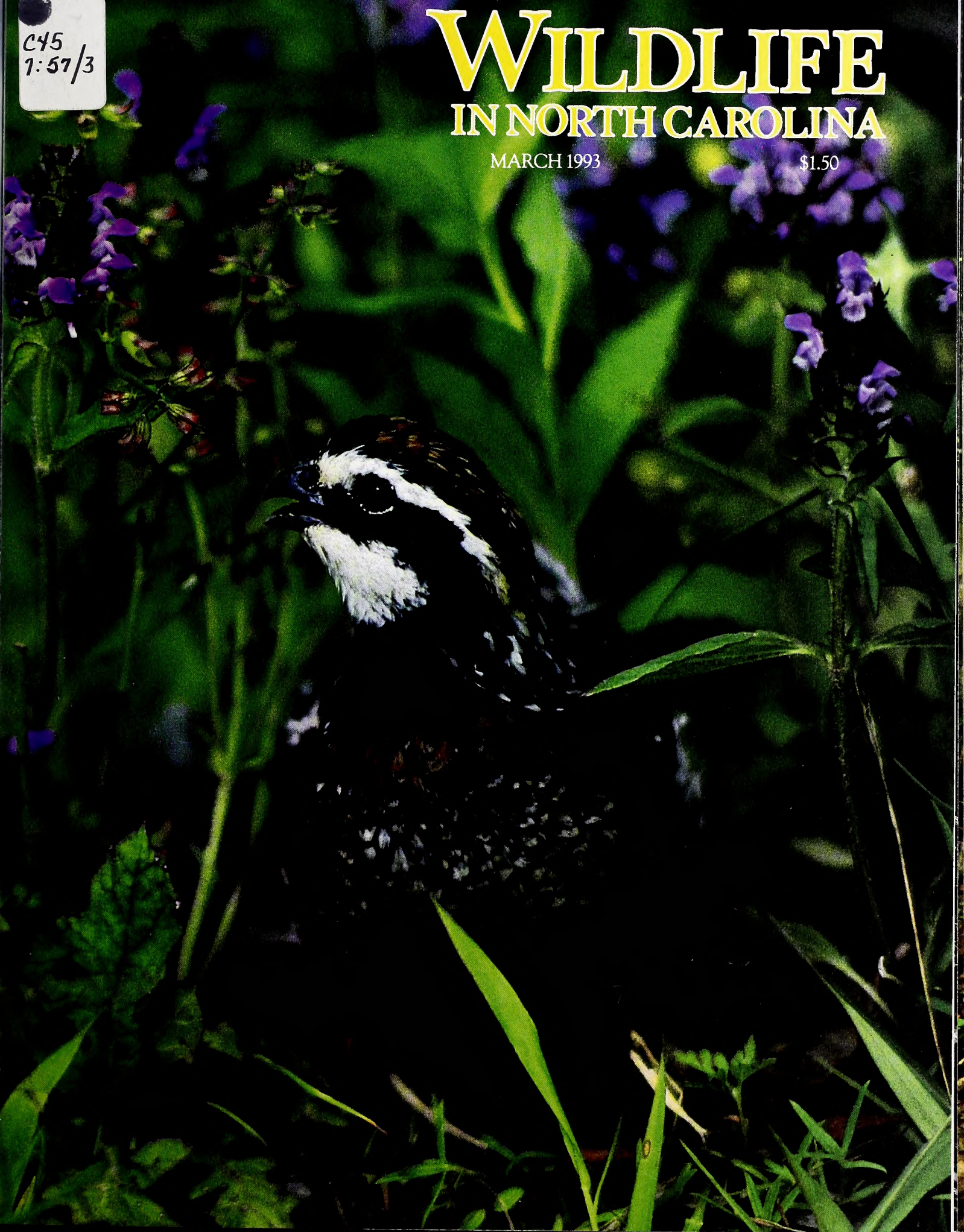

Blindfolded, with Scissors

by Jim Dean

This is a story about a crab, sort of. We were at the beach and decided that we wanted some blue crabs steamed Maryland-style. We went to the sound where it was simple enough to catch the crabs by tying weighted fish heads to string and tossing them into the water along the edges of deeper cuts and around piers. We landed the crabs with long-handled nets.

Back at the cottage, we iced down the crabs to keep them alive and also to make them inactive. We put several inches of vinegar—you can also use beer—in the bottom of a large pot, and dropped in a rack to keep the crabs out of the liquid. Then we began filling the pot with layers of live crabs, sprinkling each layer liberally with flake salt and Old Bay seasoning. Old Bay works fine if you can't get special seasonings from a Baltimore or Eastern Shore crab house.

JIM DEAN

We kept adding layers of live crabs and seasoning until the pot was filled, then put the lid on so we could steam them quickly. Or tried to. The pot was too full. We rearranged the top layers of crabs several times, but it soon became clear that we had exactly one crab too many.

"Oh well, then, take one out," someone said with exasperation. I gingerly grasped a crab by the back flipper, avoiding its claws. There seemed to be only one thing to do with it. I carried it out the door and down to the beach. There, I washed off the salt and seasoning, then watched as one blue crab, lucky beyond knowing, scuttled out to sea.

I think of that crab from time to time. He—it was a male—seems to represent the random, often whimsical, and utterly capricious nature of life. Who stays in the pot? Who gets a reprieve? And, like the crab, how often do we survive a close shave without even knowing it? Daily? More often?

I'm not sure that hunters or fishermen face threats more frequently than anyone else, but ours are more inventive. Not long after the incident with the crab, I was fishing with a friend in a borrowed boat near Harker's Island. It was one of those handsome, lapstraked, wooden Barbour outboards that were so popular during the late 1950s and early '60s. This one had seen better days, however, and we were not surprised that the boat seemed to be leaking. No cause for alarm, we figured, because we could bail it out if it got too deep. We continued fishing. As usual, I was puffing on my pipe, and my companion was smoking cigarettes.

By mid-afternoon, we began to smell gas—not much at first, and besides, all motorboats smell like gas. We kept fishing until the floorboards were awash. When my companion began to rummage around in the bilges looking for something to use as a bailer, he made a hair-raising discovery. A seam had split in the 18-gallon tank. We had been wading ankle deep in gasoline for at least an hour. Since we were both smoking, we were little more than a pair of Molotov cocktails with short fuses.

To this day, I don't know why our crisp body parts weren't found all over Cape Lookout, but somehow we got our smokes extinguished, patched the tank and bailed most of the gasoline. Even as we cautiously headed in, my companion was prepared to ride his lucky streak, and jokingly wondered whether it might be possible to let himself out behind the boat on a tethered cushion so he could safely light up.

On another occasion, I left a well-marked mountain trail to take a rugged short-cut down to the trout stream I planned to fish. While on my hands and knees trying to extract my fly rod from some especially thick rhododendron, I put my foot out to stand up and found that it was hanging over the edge of a well-hidden 400-foot precipice. Had I not snagged my line on the rhododendron, I believe I would have walked right out into mid-air just like Wile E. Coyote.

In both those instances, I became aware of the danger, but maybe it's best we don't know how often we are spared—that the driver we just passed has a snoot full and is going to hit the very next car head-on.

Small wonder we grow cautious as we grow older. We may have less to lose with each passing day, but we are increasingly loathe to lose it. We have seen too many mindless crabs scuttle to sea. We drive slowly and keep both hands on the wheel. We look before we leap, then often don't leap. We count no chickens before they hatch; indeed, we are unwilling to acknowledge that any have ever hatched.

Be kind if you see someone wading a trout stream with unnecessary care or wearing enough blaze orange to be visible from a satellite. It might be me, or someone else who's learned that we run blindfolded through life carrying sharp scissors.

Predators Belong

LEONARD LEE RUE

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Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and also to the environment we share with them.

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Nature's Ways *by Lawrence S. Earley*

Back of the Book *by Vic Venters*

Wildlife Through the Year *by Vic Venters*

Cover *This male bobwhite quail is enjoying the riches of spring. Photograph by Lloyd B. Hill.*

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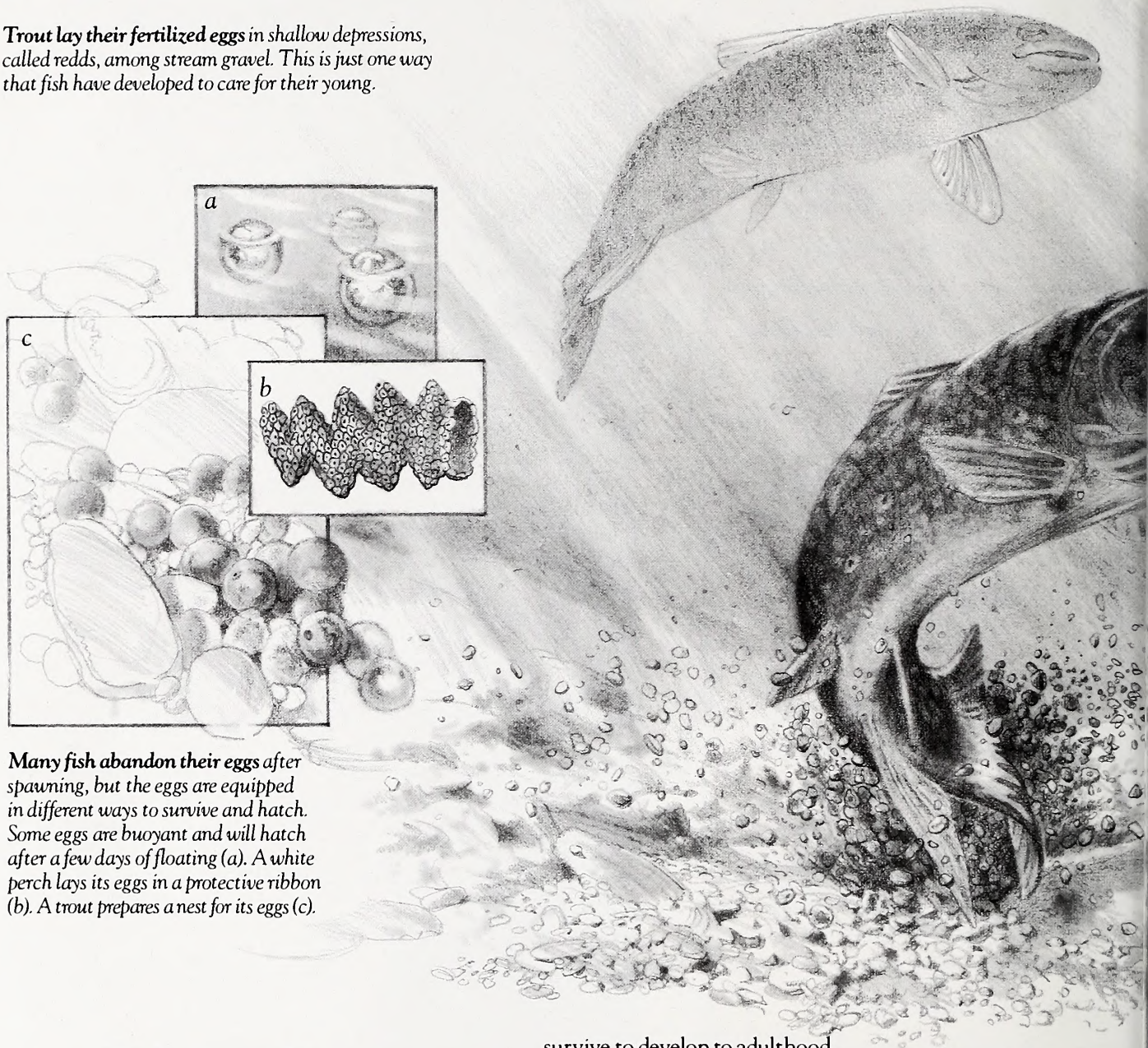
Trout lay their fertilized eggs *in shallow depressions, called redds, among stream gravel. This is just one way that fish have developed to care for their young.*



Many fish abandon their eggs *after spawning, but the eggs are equipped in different ways to survive and hatch. Some eggs are buoyant and will hatch after a few days of floating (a). A white perch lays its eggs in a protective ribbon (b). A trout prepares a nest for its eggs (c).*

Fish Families

written by Lawrence S. Earley/
illustrated by David Williams

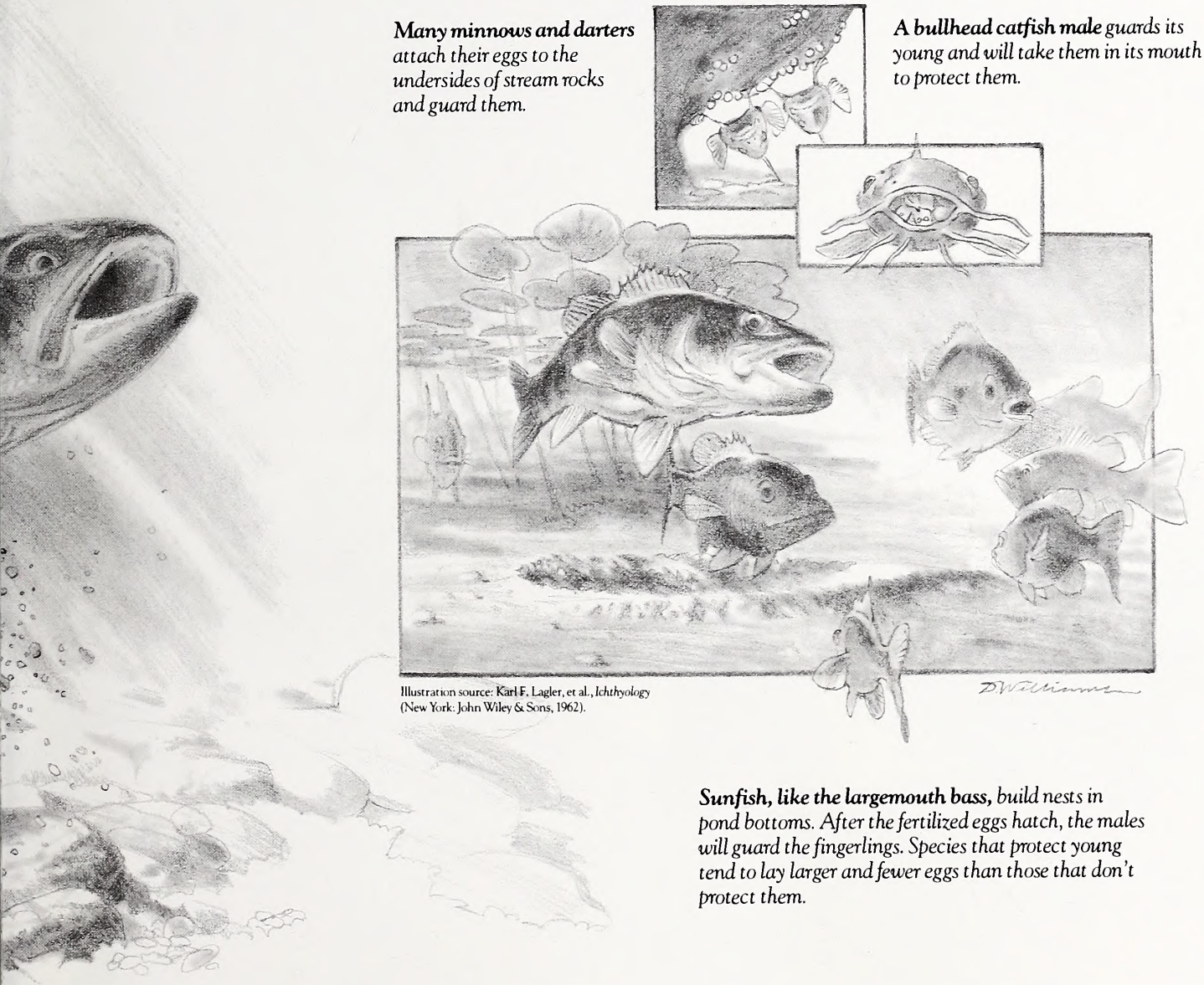
Parents with teenage children might envy the way hickory shad deal with their young. The female scatters volumes of eggs into the water, the male fertilizes them, and then the parents leave. No muss, no fuss, and no arguments about borrowing the family car.

Though it's an indifferent way of raising young, it works—at least for the shad and the many other freshwater and saltwater fish species that have adopted the strategy of broadcast egg-laying. It's quite hazardous to the young, of course: of the 10,000 to 100,000 eggs laid by a single shad, for example, only a few will survive to develop to adulthood.

Yet though abandoned by their parents, the eggs and young of the many fish that adopt this strategy aren't entirely helpless. The sheer volume of eggs and their small size make it doubtful that all of them will be eaten. Also, the eggs of many species are buoyant and the larvae are often nearly colorless, making them less visible to predators.

Some eggs scattered in the water have adhesive surfaces or threads that help them adhere to other eggs, to submerged plants or to rocks where they remain during their development. For example, the alewife (one of the anadromous herring family that spawn in the spring) broadcasts its eggs over submerged vegetation, and the eggs become attached to these plants either singly or in small clusters.

The white perch also abandons its young, although it doesn't broadcast its eggs on the water like a shad. Its strategy involves



Many minnows and darters *attach their eggs to the undersides of stream rocks and guard them.*

A bullhead catfish male *guards its young and will take them in its mouth to protect them.*

Illustration source: Karl F. Lagler, et al., *Ichthyology* (New York: John Wiley & Sons, 1962).

Sunfish, like the largemouth bass, *build nests in pond bottoms. After the fertilized eggs hatch, the males will guard the fingerlings. Species that protect young tend to lay larger and fewer eggs than those that don't protect them.*

laying its eggs in a hollow ribbon on submerged vegetation or sticks. There may be a couple of advantages to this approach. The mucous covering of the eggs may protect them from predators, plus the ribbon gets the eggs up into the water column where there is more oxygen.

Not all fish desert their young, of course. Some build a nest for them and guard them through their early stages. These fish tend to lay fewer and larger eggs than the broadcasting species. The nest builders include crappie, bowfin and bullheads, and also sunfish species like largemouth bass and bluegills. In the spring, fishermen avidly search out bluegill nests, circular depressions in pond bottoms where the males swim back and forth guarding their eggs. As many as several dozen nests may occur together, and the males defend them vigorously.

Small fish like fantail darters, sculpins and minnows also exhibit parental care, excavating nests under stones and attaching their eggs to the rock underside. Channel catfish tunnel into the banks to lay their eggs. Yellow bullheads make their nesting tunnels on the bottom of a lake or river. Bullheads take an active role in protecting their young, although in a unique way. The fry will swim into the male's mouth in case of danger. Unfortunately for some of the little critters, this protective instinct gives way to hunger in time. Timid young bullheads returning to Daddy may become a delectable tidbit instead.

Trout build nests, too, but they desert the eggs after they are laid. Trout fan a small depression, called a redd, among the pebbles on a creek bottom and lay their eggs there. Then they cover them with the pebbles. Siltation in mountain streams smothers trout redds and kills the young.

Bringing young into the world and making sure that they survive to reproduce is the main task of all fish and animal species. No wonder fish have developed so many ways to do it.

A *Luring* Alternative

Fishing for mountain trout using spinners can be a challenge, and if you release your catch, you'll enjoy the benefits on later trips.

by Randall J. Newman ©1993

Though many would not agree, I have a theory that most of us just don't possess the will it takes to be proficient at fly fishing for trout. Clearly, it's a learned sport, so maybe it's simply my lack of patience that keeps me from participating in this increasingly popular pastime. Lucky for me and others who suffer the same affliction, however, there is an alternative to fly fishing that is both rewarding and fairly easy to learn. Trout fishing with light spinning tackle and small spinners is an effective and versatile means of pursuing mountain trout in a variety of stream conditions. Furthermore, with catch-and-release practices gaining popularity, it's also good to know that spinner fishing can be just as sporting as fly fishing because the careful spin-fisherman can release fish unharmed, too.

Despite this fact, there are few articles or publications that promote spinner fishing for trout. As for me, I don't like wading waist-deep in water with a number 6 stonefly stuck in my ear and yards of line tangled around my head. And, as a novice, I'm willing to attempt any form of angling that will produce multiple specimens of *Oncorhynchus mykiss*, *Salmo trutta* or *Salvelinus fontinalis* (rainbow, brown and brook trout, respectively, if you didn't study Latin). And yes, I had to look these up.

KEN TAYLOR

***Small spinners and lures** that imitate minnows are good bets for rainbow, brown and brook trout (shown top to bottom). In restricted waters, lures must have only one single hook so that fish can be more easily released, but treble hooks can be removed or replaced.*

Trout fishing to me is more than a hobby; it satisfies a real need to explore and enjoy the great outdoors. Regardless of whether I catch fish or not, I simply enjoy visiting the environment that can support trout because streams that hold trout will almost always be clean, scenic and often fairly remote. That makes trout fishing of any kind a great escape, and in recent years, I've most often made my getaway armed with a light spinning rod and a few well-chosen spinning lures.

I grew up in Sylva, and my first experience trout fishing was on the Tuckasegee River. My father would carry me on his back to a large rock in the middle of the river upstream from the town of Webster. I would drift corn down whatever water was within my reach while he waded upstream to fly fish. For those unfamiliar with the Tuckasegee, the flow of the river is controlled by several impoundments on its headwaters in the southern end of Jackson County, and the water level can rise very fast and with little warning.

I was on my fishing perch one morning when the water rose and the rock all but disappeared before my father returned to help me to shore. I can't say that this particular incident led me to adopt my current fishing style, but it does stand out in my mind. Even now, some 18 years later, this is not the way I care to fish for trout. These days, I mostly fish remote native waters where stream flow can be predicted by watching the weather channel the night before.

Danny Dillard, a Sylva native and an avid and skilled fisherman, introduced me to spinner fishing. Danny took me to some of his best fishing spots and literally caught fish out from under my feet while I stood and watched in amazement. Yet, he was patient and willing to teach me. Danny's mountain ways were particularly appealing to me. Knowing that I was born in Tennessee and had moved to North Carolina at an early age, he once told me, "You may be a stocker, but you've got some color." That's a distinction that I am very proud of.

Danny and I were fishing a small stream near Cashiers one day after work, and as dark approached I became concerned about the 45-minute drive back to Sylva. The stream was small by anyone's standards, and I asked Danny how far up it we would fish.

"When you see the water bubbling out of the ground, then we can turn around and head back to the truck," he said. His humor holds a lot of truth about where trout will live. Since that day I have caught fish in places I would once have never thought had enough water to support trout, and though I have not mastered all Danny's techniques, I have adapted some of his basics to my own style. You may find some of those tips useful, especially if you're just beginning to fish for trout.

The tackle used to spinner fish for trout is very simple, and most anglers probably already have everything they need. My preference is a 5- to 6-foot graphite spinning rod—I like it fairly stiff—and a small reel that features a one-finger bail-trip mechanism. I use 6- or 8-pound test monofilament and, of course, a spinner. The short, stiff rod lends itself to fishing the small, overgrown streams that are often overlooked by others. The absence of flex allows you to make powerful, short-swing casts without getting hung on rhododendron or other cover behind you. When I cast, the rod tip almost never passes behind me. Using mostly wrist, I make a circular, underhand flip, releasing the line when the rod tip is right at water level and aimed upstream. This sends the spinner on a flight path up the open part of the stream, and just above the water. More importantly, it's away from most overgrowth. Flexible rods add action when playing fish, but they have two drawbacks. The flexed rod adds line drag causing shorter casts, and the position of the rod tip in motion is harder to predict, making an accurate aim in tight places more difficult.

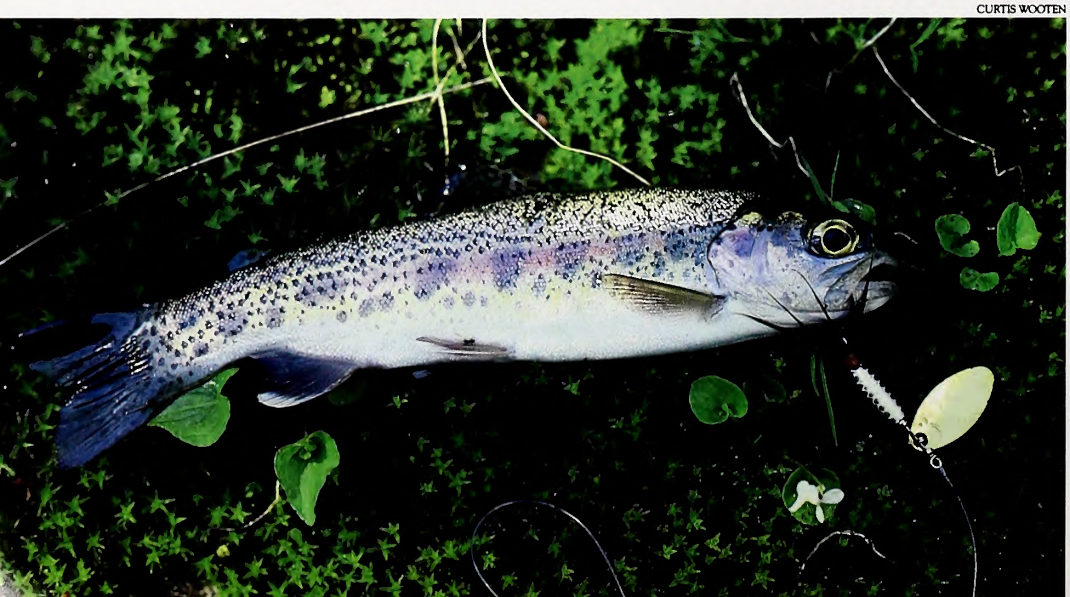
Reel and line selection are really a matter of choice, and some like ultra-light equipment while others prefer something slightly larger. Fish with whatever gives you the most confidence. I find the one-finger bail-trip mechanism indispensable because I can literally hold bushes out of the way with one hand and cast with the other. If you use this type of reel, though, take care not to overfill the spool with line. It seems to me that the extra parts required for the trip mechanism cause more line tangles than with a conventional reel. I noticed that after a few hours of fishing, the frequency of tangles drop off significantly. Either I had gotten better as the day progressed, or I had lost enough line so that my reel simply performed better. I doubt that my skills improved that rapidly, so I've concluded that the reel simply functions better when it isn't filled to the gills with line. Part of it may be that line performs better because it loses its curl as you fish with it. At any rate, if it makes you uncomfortable not to have at least 3 miles of line on your spool when you're 4 miles from your vehicle, then stick an extra refill pack of line in your fishing vest.

A reel that has a fast-retrieve ratio is also a plus for most streams. Because trout face upstream looking for food, I prefer to cast above them and let the spinner approach downstream as a normal meal would. That means that you have to reel relatively fast so that you won't hang up, and the action of the spinner can overcome the current. Don't be afraid of reeling too fast. If a trout is serious about eating what you offer, it will be aggressive enough to catch it.

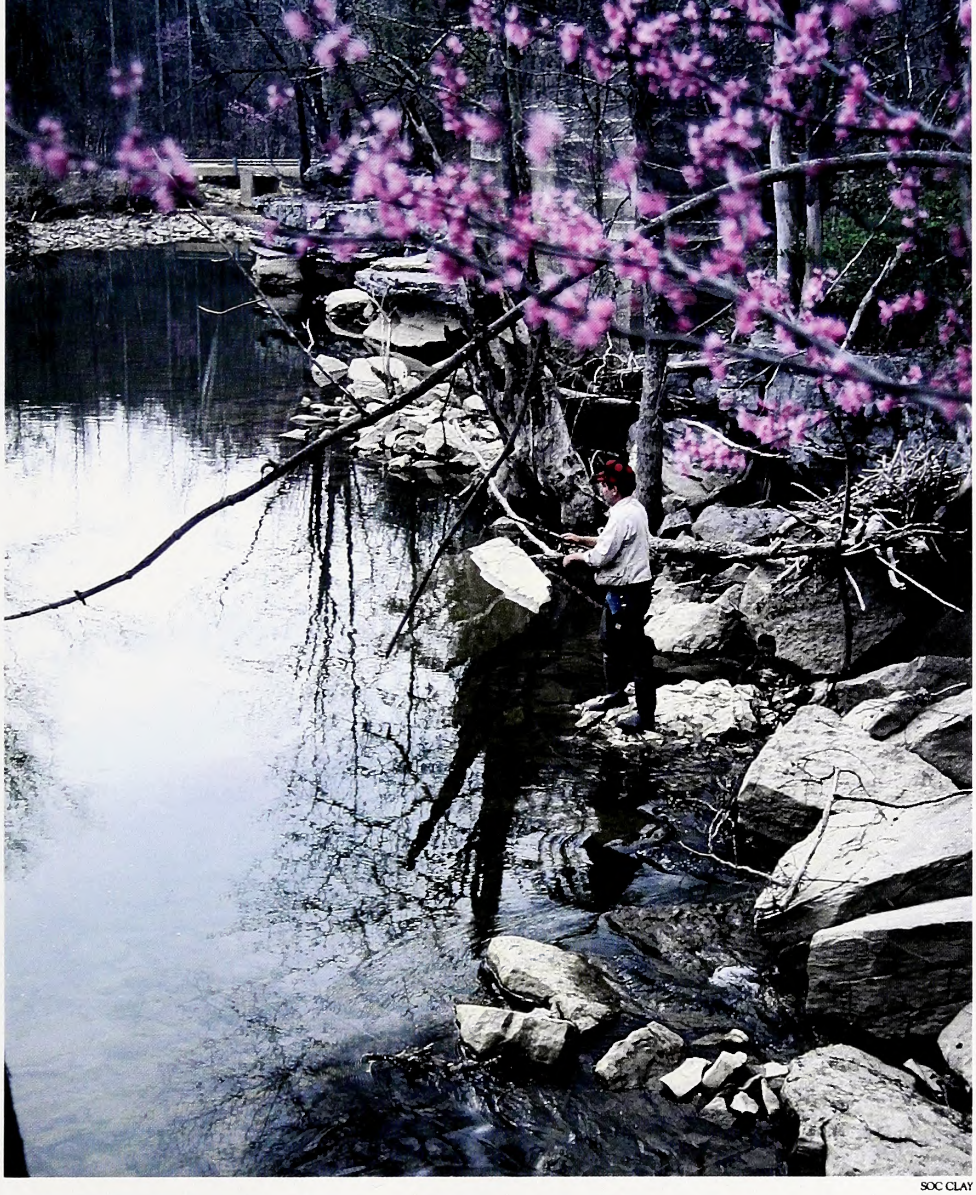
Your choice of spinners is important. A 1/16th- or 1/8th-ounce spinner with a gold blade is my favorite. My favorite brand is the Panther-Martin. The main shaft passes through the blade making it very durable and giving the lure plenty of action. Orange and black hackle seem especially effective, though the spinner will still catch trout after the hackle wears off.

One drawback is that I have not been able to find this lure with a single hook, and when fishing native trout waters, it's necessary to cut two of the hooks off the treble or refit the lure with a single hook. Replacing the hook is easy if the lure has a small split-ring, and you can also buy split-rings. Be sure that the single hook is sharp. Many anglers are equally successful with silver-bladed spinners, but I have never had great luck with them in western North Carolina streams. Try different ones until you find a favorite. I always carry a variety and switch if what I start with doesn't yield strikes.

CURTIS WOOTEN



***This small rainbow trout** was caught on a spinner. The flash of the spinning blade is hard for trout to ignore, especially in spring when streams are high and dingy.*



SOC CLAY

***Many trout fishermen** like to fish large pools like this one, but the author prefers to get off the beaten track and catch trout in much smaller streams.*

If you feel brave, try a small crankbait, but hang on tight because you may be surprised at the results. Small crankbaits that imitate minnows or crawfish are very attractive to trout, especially big browns. You'll most likely have to replace their treble hooks with one single hook, however.

A small gold snap swivel will make changing lures easier, though it adds another possibility of equipment failure, and could mean a lost fish. I often pinch a split shot on my line when fishing deeper holes on streams that are relatively open. It also adds casting distance to the light lures. A tip is to put the split shot very close to the knot tied to the spinner or swivel. It's been my experience that the split shot causes many of my hang-ups, and placing it close to the spinner usually cuts down on problems. I have a feeling that the split shot looks like a head on the spinner though at the speed that most trout strike, they have little time for a thorough inspection of a potential meal.

Many tactics that work well with other types of trout fishing hold true when spinner fishing. Dress in colors that blend with your surroundings, fish near dawn and dusk and always be willing to travel the extra mile. These elements will vary from stream to stream and also with the change of seasons, but find a pattern that works and stick with it.

One of the biggest misconceptions that I had when I started trout fishing is the belief that all trout are spooky. It just ain't so. Depending on water clarity, weather, time of year and the particular species of trout, some fish are afraid of clouds passing over while others let you walk right up to them. One day while fishing with my father, we had a stream-bred brown trout hold its ground so firm that I was able to wade up to it and poke it gently with my rod tip several times. We laughed, shook our heads and continued on our way. That fish may have been sick, or asleep, but if not, it's probably still in that pool. Actually, such occurrences are rare, and wild browns in clear water more often deserve their reputation for wariness.

Brook trout, or "speckles" as mountain folk call them, will often shoot by you in a stream like a torpedo in overdrive. A little stealth technology will improve your chances of catching brookies and other trout as well. If you're fishing with someone, take turns by alternating the pools you fish. Keep your conversation quiet and approach slowly, especially if you're wading. Fish each pool from as far away as you can, starting on the lower end and finishing in the swift water at the head. I have caught fish on both ends, though the upper part of a hole is usually where the fish wait for food in the oxygenated water.

Spinner fishing will allow you to cover a great deal of water in one outing. Make only a few casts in each area. If you don't get a strike, move up to another spot. Spinner fishing is not going to coax a lethargic fish to strike the way fly fishing sometimes can. Use the hit-and-run method, and don't waste time fishing one pool or run too long. It will not increase your success rate, and it may keep you from fishing better waters upstream that you might otherwise not have time to fish. This is especially true for late fall and winter fishing when the days are short and fish are slower.

Jumping in feet first and fishing a stream is the best way to judge its potential. You may not catch loads of fish (if any) the first time out, but with every return trip you become more familiar with all the variables and your success rate will increase.

Planning a weekend fishing trip for me usually starts a week before, and the anticipation is sometimes more fun than the actual trip itself. Ninety-nine percent of the time, I go with the intention of releasing all the fish healthy enough to return to the stream. This serves two purposes. First, it almost guarantees that fish will be there the next trip, and it allows me to add to my daily bragging count those that got away before I landed them. Seriously, though, it's not as disappointing to lose a fish if you were going to release it anyway.

Be prepared for strange looks when you tell inquirers that you caught 30 or 40 trout on a trip. They may think you're some kind of fish-murdering wildlife offender until you explain that you release all those fish to catch again sometime. Then, they might think you are crazy to spend all day fishing with nothing to show for it. If you have a family, make them think that trout fishing is something that you have to practice very often. My wife thinks it takes several weekends out of each month just to keep up with the latest trout angling technology.

I wonder where she got that idea? ☐

MELISSA McCAW

Can We Still Save SMALL GAME?

Bobwhite quail, rabbits and other small game species have been declining since the 1930s, yet biologists have known the solution for years. The elusive key to recovery is making habitat restoration economically feasible for private landowners.

by Vic Venters

After watching the feeble flight of a pen-raised quail during a recent bird dog buying expedition, a hunting partner of mine bemoaned the proliferation of pen-raised quail shooting in North Carolina.

"People go shoot a bunch of pen-raised birds and think they've gone quail hunting," Bill Palmer said. "That isn't bird hunting."

I was eager to show Bill, a doctoral student studying quail biology at N.C. State University, some "real" bird hunting down in Onslow County. After leaving the training grounds, we hunted the brushy hedgerows and fallow fields at the pig pen farm and the old Winberry place, then the food patches at three young clearcuts, finally ending up in a field of standing corn beside a regularly burned stretch of cutover. Eight hours, four sore legs, and two tired bird dogs later, we still hadn't moved a covey. Unfortunately, that's often the face of "real" bird hunting today.

The habitat we covered was pretty good by today's standards—maybe not plantation quality but certainly managed with Mr. Bob's well-being in mind. Even allowing for the day's hot weather and poor scenting conditions, it was a frustrating experience, and one shared with increasing frequency by bird hunters across the state.

As the mid-1990s approach, wild quail populations stand at record lows in North Carolina and across the Southeastern region.

***A coordinated series** of new programs and incentives offers hope for reversing six decades of declining small-game populations, particularly for bobwhite quail on private lands (left).*

Shrinking populations are nothing new, of course; by all accounts quail and rabbit populations began a slow decline in the mid-1930s with the advent of mechanized agriculture and its attendant clean farming philosophy. That downward trend intensified in the early 1960s, and a population tailspin in the 1980s has been nothing short of cruel for both the bird and those who love it. "If the current population trend continues," writes Mississippi biologist Leonard Brennan, "we are likely to lose bobwhite hunting opportunities across the majority of this quail's range by the year 2000."

It's a sobering prediction and is, in Brennan's words, "nearly unfathomable because effective habitat management techniques for bobwhites have been known for over half a century." The sticky part seems not "how to" improve quail habitat and populations—it's actually "doing it." That's because modern agricultural and silvicultural techniques and good quail habitat have not, up to now, ever been truly compatible.

Six decades of clean farming (the practice of disking under harvested crops and other potential small-game cover and leaving fields bare during the winter), use of agricultural chemicals, reduced burning, maximized timber production, small field consolidation, urban sprawl, fescue pastures—among others—have led not only to declines in the actual amount of quail habitat, but also to *habitat fragmentation* across the Southeast.

What this means is that in many areas quail populations now exist mostly in pockets or "islands" of suitable habitat. Although bobwhites are resilient birds blessed with high reproductive rates, they also have a small

DEBORAH CONGER

The clean farming techniques *practiced on many farms today remove the breeding habitat, food and escape cover needed to maintain healthy small-game populations. This handsome, well-kept farm shows part of the problem for those who look closely. There's no wildlife cover left along the edges of fields.*

home range and a relatively short dispersal distance. When a population in a pocket is greatly reduced or extirpated, recolonization is all the more difficult when the surrounding areas are barren of birds.

Some biologists theorize that this habitat fragmentation has made "island" quail populations more susceptible to mortality factors that in the past probably had little or no effect on overall populations: factors such as predation, weather extremes, too much hunting pressure, and disease and genetic pollution from the introduction of pen-raised birds.

With the fragmentation issue in mind, the N.C. Wildlife Resources Commission has embarked on a new direction in its small-game program in an effort to restore small-game habitat on a landscape scale. This has meant re-examining some long-held management practices. For instance, emphasis in North Carolina is now being shifted from the distribution of free annual planting materials to a program designed to teach landowners how to incorporate total small-game management with existing land uses. This includes promoting warm-season grasses, pesticide fact sheets, the N.C. Forest Stewardship Program, improved right-of-way management and habitat seminars for landowners. Although perennial seed mixtures will still be available from the Wildlife Commission, the free handouts of annual food plantings have been eliminated in lieu of expanded educational efforts.

"The free distribution of annual seeds for food and cover plantings was a good program in that it originally gave Commission biologists the chance to visit annually with landowners to advise them on proper small-game management," explained Terry Sharpe, the Wildlife Commission's small-game project leader. "That has changed now that many farms are owned by citizens who work off the land.

"The free annual seed program was also geared only toward those persons with an intense interest in quail or rabbit management," Sharpe elaborated. "With habitat so fragmented today, we saw the need to emphasize programs that have the potential to influence small-game populations positively over extensive areas of the state, rather than using *intensive* management practices that affect habitat only on a localized basis."

Of course, the key to restoring small-game habitat on a landscape scale will be finding a way to make needed management practices economically viable—and thus attractive—to farmers and landowners. While we can't turn back the clock to recreate the habitat conditions found in the early 1930s, listed below are a number of new programs and educational efforts that have the potential to mesh small-game management with existing major land uses.

Habitat Workshops

A cornerstone of the Wildlife Commission's new direction in small-game management is a series of 18 seminars being held across the state during the year to assist landowners, land managers and sportsmen in developing their lands for maximum enhancement of small-game populations.

Topics covered focus on small-game species, but also include turkey, wood duck and deer management, depending on the seminar. Specific habitat techniques covered include prescribed burning, woodland management, hardwood management, food-planting practices, and utilizing warm-season grasses, among others.

The spring seminars began in February and will run through early April. For a schedule of March and April seminars, see this month's "Back of the Book." For more information, contact the Commission's Division of Wildlife Management, 512 N. Salisbury St., Raleigh, N.C. 27604-1188.

Food Plot Management

Food plots have been a staple of Southern quail management since the 1940s when they were widely advocated as a fool-proof method for increasing bobwhite populations. When properly sited and utilized, food plots can still be a useful part of habitat management.

However, recent research conducted with radio-marked wild quail indicates that food plots often concentrate birds and expose them to higher than normal mortality from wild predators or excessive hunting pressure and can actually do more harm than good to populations.

To work as intended, food plots must be a component of a broad-scale habitat-improvement program. They do not work well as the sole focus of habitat management, as they are often used. On today's farms, small-game populations are more often limited by a lack of good breeding cover and lack of escape cover in the winter—not by a lack of food. To be of any value to small game, food plots must be located in adequate surrounding cover.

This spring the Wildlife Commission published a new brochure, *Planting Food Plots for Small Game*, that summarizes the best management practices for small-game food plots. The brochure details the specific points a land manager should consider when planning a food plot. The Commission has also pub-

KEN TAYLOR

***This demonstration farm showcases** excellent small-game wildlife habitat with brushy hedgerows and cover strips left adjacent to row crops. The fragmentation and loss of quality habitat across the Southeast are believed to be the principal reasons for small-game declines.*

lished a list of sources where various wildlife food seeds can be ordered. To obtain a copy of the brochure, write the Wildlife Commission's Division of Wildlife Management.

Warm-Season Grasses

Currently, most of North Carolina's 1 million acres of cattle pastures are planted in fescue or other cool-season grasses. Unfortunately, fescue rates one step below "terrible" as habitat for small game, providing almost no cover and little food. On the other hand, native warm-season grasses, which grow in the summer months, are not only highly nutritious for cattle, but provide excellent small-game habitat when properly managed.

Warm-season grasses such as switchgrass, big bluestem and Indiangrass make excellent wildlife habitat because they grow in bunches, providing overhead cover as well as ground-level travel and escape lanes for rabbits and quail. They are also economically attractive to cattle growers because they need little fertilization, offer excellent erosion control, and provide high-quality forage in the summer months when fescue and other cool-season grasses are withered and dry.

By increasing the acreage of warm-season grasses, cattle growers can potentially realize higher profits as well as help small-game wildlife populations. For more information, contact your local Soil Conservation Service office or write the Wildlife Commission's Division of Wildlife Management for the management booklet, *Warm Season Grasses for Virginia and North Carolina: Benefits for Livestock and Wildlife.*

Forest Stewardship Program

One of the most promising programs for influencing habitat improvements on some of the state's 12 million acres of private forestland is the N.C. Forest Stewardship Program, a comprehensive multi-agency effort to assist private landowners in improving and protecting their forest resources.

Under the program—open to those who own 10 or more forested acres—landowners who've enrolled receive technical assistance in developing a land-management plan based on the landowner's objectives for timber production, wildlife, soil and water conservation and recreational enhancements.

The program guidelines give the landowner the flexibility to choose the management practices that best suit his or her objectives and capabilities. Participants receive a management plan tailored to their objectives prepared by a county stewardship committee consisting of local resource professionals from the seven cooperating state and federal agencies, including the Wildlife Resources Commission. Last year, the Wildlife Commission hired three additional biologists to help implement and advise landowners about wildlife habitat-improvement practices on Forest Stewardship lands.

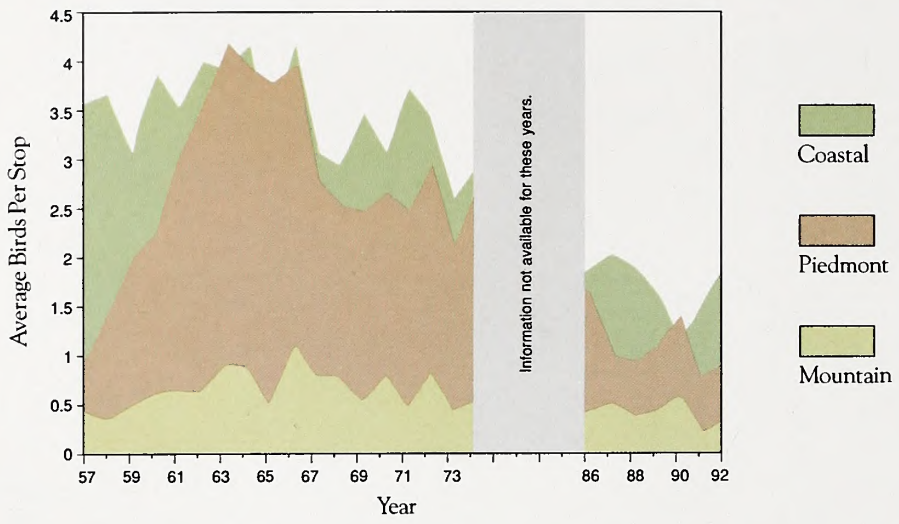
Landowners with an approved stewardship plan are also entitled to the Stewardship Incentives Program that will help pay for management practices such as wildlife-habitat improvements, controlled burning, reforestation and timber-stand improvement, among others.

Because a management plan is developed under the guidance of a multi-agency stewardship team, the landowner is assured of coordinated—not conflicting—advice. The recommendations typically focus on practical modifications of existing conditions, rather than costly investments.

To learn more about the Forest Stewardship Program, write: Forest Stewardship Coordinator, Archdale Building, Box 27687, Raleigh, N.C. 27611-7687.

Educational Video

In conjunction with the state's Cooperative Extension Service, the Soil Conservation Service, the N.C. Wildlife Federation and the N.C. Forest Service, the Wildlife Commission has funded and produced *Pre-*



Every spring, Wildlife Commission biologists survey 27 call routes in order to estimate trends of quail populations in North Carolina. Population levels are indexed by the number of bobwhite quail heard whistling at timed spots along a fixed route. As the graph indicates, populations in the Piedmont and Coastal Plain have been on a general decline since the mid-1960s.

serving Our Wildlife Heritage: Small-Game Management, a new video that illustrates habitat management practices and techniques on three demonstration farms in North Carolina.

The video features real-life farmers and landowners who've actually improved wildlife habitat on their farms and, significantly, have done it profitably. Some of the techniques demonstrated include controlled burning, fencing of stream banks to keep cattle from waterways, creating brushy-edge habitat, and selecting plantings for food and cover. The video also emphasizes the many benefits that humans get from improving wildlife populations beyond simply having more small game to hunt.

The video will be available through the Cooperative Extension Service or the State Film Library.

Pesticide Fact Sheets

In many areas, North Carolina's 4 million acres of row-crop farmland have become virtual wildlife deserts, devoid of quail, rabbits and many nongame wildlife species. While farm chemicals are not solely to blame for wildlife declines, some pesticides are unquestionably harmful to wildlife.

While pesticide use will remain a fact of life in modern agriculture, farmers today have a choice of a wide variety of chemicals that will control agricultural pests as needed, yet be less toxic for wildlife.

Working with the N.C. Cooperative Extension Service, the Wildlife Commission has helped fund and produce a series of fact sheets that cover pesticide use with soybeans, corn, tobacco, cotton, peanuts, small grains, fruit trees and Christmas trees.

Each fact sheet is devoted to pesticides used with each of the above-named crops, and it provides a detailed evaluation of the pesticide alternatives that are available. Pesticide applications are advocated within the concept of Integrated Pest Management, which is the reduction of a specific pest with a specific pesticide, rather than the wholesale application of very powerful universal pesticides that can kill or harm a broad range of organisms—including farm wildlife.

"Instead of going out and spraying everything with a particularly high-powered pesticide, the farmer is encouraged to look at where the problem is and then determine if the problem warrants a pesticide application," said Dr. Pete Bromley, a wildlife ecology professor at N.C. State University. "If the farmer decides treatment is necessary, then he can look in his fact sheet and pick out the most workable option that may be least toxic to wildlife."

The Wildlife Commission is also helping fund a major pesticide research project on intensively farmed areas at the Alligator River National Wildlife Refuge, begun last year by N.C. State researcher William E. Palmer. When completed, the study should yield data on the specific effects of certain pesticides on small-game populations.

For facts sheets, contact your local N.C. Cooperative Extension Service offices.

Right-Of-Way Management

North Carolina's roadways and power line right-of-ways comprise hundreds of thousands of acres of land maintained in the early successional vegetative state that many small-game and other wildlife species prefer. Much of this land could be easily improved for small game simply by altering mowing schedules so that mowing takes place after the breeding season.

With the Wildlife Commission's guidance, the N.C. Department of Transportation has launched a pilot program along I-40 between Orange and New Hanover counties. This new program will implement mowing and management plans along selected highways that favor wildlife. (See this month's "Back of the Book" for more details.) In addition, several utility companies have expressed interest in implementing improved wildlife management on lands they control.

Quail Unlimited

No discussion of quail habitat improvement work would be complete without mention of Quail Unlimited, the private conservation group dedicated to improving habitat for small game and other wildlife that depend on early successional vegetation.

Since its inception in 1981, QU has grown to over 50,000 members with active chapters nationwide. In North Carolina, QU has over 4,000 members and 15 active chapters. QU's primary conservation mission is habitat improvement.

Each year, local chapters raise funds at annual conservation banquets. Of that money, 40 percent goes to QU national headquarters, while the lion's share—60 percent—remains with the individual chapter for local habitat work. This flexibility allows each chapter to respond best to the area's immediate needs.

For more information, write Quail Unlimited, P.O. Box 10041, Augusta, Ga., 30903, or call (803) 637-5731. You can also contact QU mid-Atlantic representative Don Buckland, P.O. Box 110, Stuart, Va. 24171.

Landowners Hold The Key

Six decades of bobwhite habitat decline across the Southeast have made it quite clear that when small-game management practices clash with economic reality, quail and rabbits almost always come out on the losing end. The options open to landowners today offer no *easy* solutions to population declines, but they do offer hope because they are economically viable within the constraints imposed by modern agricultural and silvicultural practices. Making this hope a reality, however, means that landowners must reappraise "business as usual" practices and take a new look at these old problems. ☒

The Spawning Runs

Striped bass, shad, herring and sturgeon are among the anadromous species that live in salt water, yet climb coastal rivers each spring to spawn in fresh water.

by Tony Mullis

Why would a creature suddenly leave the place where it has spent most of its life for a destination that it has not seen for perhaps years? And why would it do so when the new environment is so alien that its body requires extraordinary changes just to survive?

These are some of the questions underlying the mystery of fish that live in salt water for perhaps years at a time, but then swim to freshwater rivers and creeks to spawn. They are questions, alas, with few answers.

We call these fish "anadromous" after a Greek word meaning "running up." And indeed running up is exactly what anadromous fish do, following a secret instinct at a curious juncture in their lives that causes them to swim from the ocean into our estuaries and then up our rivers and creeks seeking mysterious locations where they spawn and where new life begins.

Anadromous fish are not the only fish that make regular seasonal migrations between fresh and salt water. The general term describing the instincts of all such fish is "diadromy." Diadromy may take several forms, but the ones familiar to most of us are "anadromy" and "catadromy." The difference lies in the direction these fish take. Anadromous fish live in salt water for most of their lives, but migrate to fresh water to breed or spawn. Catadromous fish live most of their lives in fresh water, but migrate to salt water to breed.

Well over 100 species of fish are diadromous, and they are found around the world. About half are anadromous, another fourth are catadromous, and the rest are amphidromous, species that migrate from freshwater to the sea for reasons other than spawning. Most of these are species that are not native to North Carolina or even to North America. Many are species that are unfamiliar to the average person.

Some of the most famous of anadromous fish are the Pacific salmon. These fish live for

KEN TAYLOR

***Flashing silver** in the strong spring light, a white shad is netted by an angler along the Cape Fear River.*

KEN TAYLOR

Wildlife Commission technicians *remove brood striped bass from the Dan and Roanoke rivers in spring and inject them with hormones to trigger ovulation (left). Raised in hatcheries, striper fry are then stocked in inland reservoirs.*

KEN TAYLOR

Another migratory fish species, *the American eel, is not anadromous. That's because it lives in fresh water most of the year and then swims to salt water to spawn. Species that exhibit this behavior are called catadromous.*

DIVISION OF MARINE AFFAIRS

most of their lives in the ocean and then, when they mature, the adult salmon return to the very stream where they hatched many years before. They swim far upstream to the graveled spawning areas, dodging bears, eagles, commercial nets and the lures of sport anglers along the way. After spawning, the adults die and their carcasses litter the stream banks until they are consumed by carrion-eaters or until they decay and their nutrients return to the earth.

Many species that are native to or widely introduced in North Carolina and are familiar to most fishermen are diadromous in other parts of their range, but not in North Carolina. For instance, all of the North Carolina trouts (brown, brook and rainbow) are anadromous in other parts of their range. The highly touted steelhead of the Pacific Northwest is simply a sea-run rainbow trout.

The better-known anadromous species in North Carolina include striped bass, Atlantic sturgeon, American (white) shad, hickory shad, and "river herring" (alewife and blueback herring). These fish spend most of their lives in the Atlantic Ocean or in the estuaries where they grow rapidly and mature. However, primarily during the spring months of February through May, they migrate up coastal rivers to breed.

Male striped bass usually mature and spawn for the first time at the age of 2 or 3 years, while females mature at an age of 4 to 6 years. The striped bass that spawn in the rivers from the Neuse River in North Carolina south to Florida live during their non-spawning months in the estuaries where these rivers flow. These fish apparently never, or seldom, enter the Atlantic Ocean. However, those that spawn from Chesapeake Bay into Canada live in the estuaries until they are several years old, and then they join large migratory schools that live in the ocean except during their spawning runs. Those fish that spawn in the Roanoke River are intermediate—that is, most spend their nonspawning months in estuaries, particularly Albemarle Sound, while a few may join oceanic schools.

When they mature, North Carolina striped bass ascend coastal rivers to the vicinity of the fall line where the flow of the river is swift and turbulent. Spawning occurs at or near the surface, and a female may be surrounded by many males. The eggs and sperm are broadcast into the water. Fertilized eggs and the larvae that hatch from them drift in the river current down to the estuary. The young fish remain and feed in the estuary until they mature, then migrate back up the river to spawn. After spawning, adults usually return to the estuary or the ocean by early summer.

American and hickory shad and river herring live most of the year in the ocean. Most American shad mature at 3 to 6 years old while hickory shad, alewife and blueback herring mature in about 2 to 4 years. While some

individuals of these species may ascend rivers as far inland as striped bass to spawn, most spawn much farther downstream. Depending on the species, the eggs sink to the bottom, adhere to vegetation and other substrate, or drift with the current until they hatch within a few days. The adults usually return to the ocean soon after spawning, but the juveniles linger for several months in the lower rivers and estuaries before migrating to the sea.

Atlantic sturgeon often do not mature until they are over 20 years old, particularly in the northern part of their range. After spawning in rocky areas, the adhesive eggs sink to the bottom in clumps and hatch in about 12 to 20 days. After hatching, the juveniles may remain in fresh water for up to five years before moving to the sea.

The white perch, a species that is closely related to the striped bass and native to our large, low-salinity sounds, is semianadromous. This species makes relatively short migrations from brackish water to fresh to spawn. Nevertheless, it still meets our definition of anadromous because it lives most of its life in salt water but migrates into fresh water to spawn.

Unlike salmon, none of these species die after their initial spawning act. All of the adults return to salt water after spawning, except for individuals that are caught by fishermen or die of other causes while at or returning from the spawning grounds. All of these species may return to spawn each year as long as they live. Striped bass and sturgeon are especially long-lived, meaning they will spawn many times.

Striped bass, white perch and river herring have been widely introduced into inland reservoirs, isolated from salt water by many miles and countless dams and barriers. At many such sites, these fish have done quite well and have established reproducing populations. A good example is the landlocked striped bass population in John H. Kerr Reservoir that runs up the Dan River to spawn. Stocked striped bass in other inland mainstream lakes make runs to the turbulent tailraces of the next dam upstream in futile efforts to spawn. The river herring in Gaston and Roanoke Rapids lakes are important contributors to the forage base in these lakes and to the bait wells of area anglers. And the white perch in Falls of the Neuse and other lakes have reproduced too successfully. They have overpopulated, stunted and are threatening the food supply of other predators.

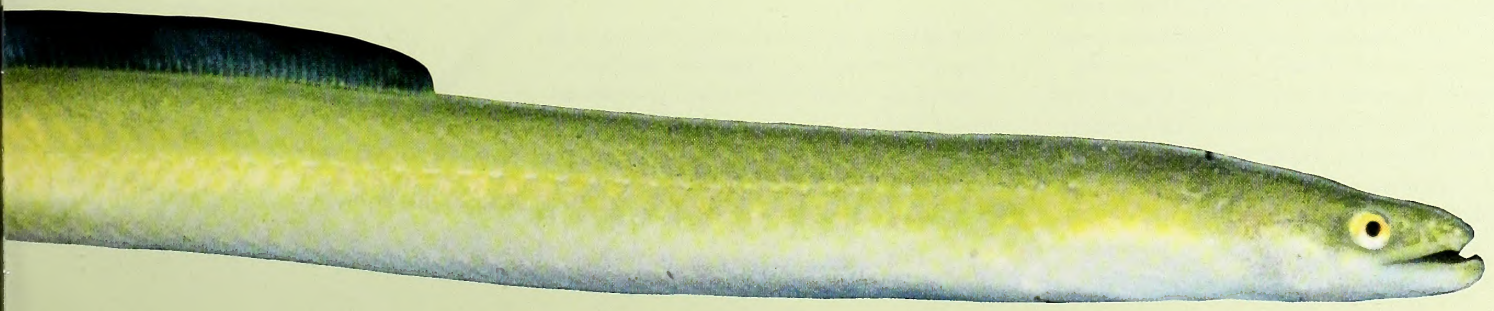
WILLIAM ROSTON

Striped bass are perhaps *the most notable of spawning fish in North Carolina to suffer population declines. Causes may include water pollution and overfishing, but high water levels created by irregular releases from upstream dams during spring spawning are considered the biggest problem.*

Are these fish populations anadromous? And what about those other fish, like white bass and several of the suckers, that make spawning runs up tributary streams from the lakes where they live most of the year? These fish are not anadromous because, according to our definition, they do not migrate from salt water to fresh water to breed. Rather, the fish that make short spawning runs up tributaries entirely within fresh water are termed "potamadrous."

The American eel is our best known catadromous species. Male eels remain primarily in salt or brackish water. But the females ascend rivers and streams to enter inland lakes and live out most of their lives far from the ocean. In late summer, females that are about 7 years old migrate to the sea where they are joined by mature 4- to 7-year-old males. Then both travel to the Sargasso Sea (the specific site is still largely undetermined), spawn and die. The eggs and hatchlings are carried back northward and inshore by the current to the coastal waters of North America where they begin their upstream migration to complete the life cycle.

Virtually all of the unimpounded coastal rivers and streams in North Carolina support spawning runs of anadromous and catadromous fish. However, the spawning populations of certain species are stronger in some rivers than in others. For example, the catch of striped bass in the Roanoke River has historically been, and continues to be, much larger than those in streams farther south in the state. On the other hand, several tributaries of the Neuse River, such as Pitchkettle Creek, are famous for their runs of hickory shad, and the town of Grifton celebrates the "Shad Festival" every year. There are histori-



North Carolina's Anadromous Fish

The sturgeons
Principal river: Cape Fear River

Once, eastern rivers resounded with the sounds of huge sturgeons breaking the surface. Native Americans and settlers valued Atlantic sturgeon and shortnosed sturgeon for their roe. Spawning generally peaks in March in North Carolina. The eggs sink to the bottom in clumps and generally do not hatch for about 12 to 20 days. The juvenile fish stay in fresh water for up to five years before swimming to the ocean. Sturgeons are not sexually mature until they are about 20 years old.

Blueback herring
Principal river: Tributaries of Albemarle Sound

The blueback herring runs in large schools with the alewife (another herring species) and shad. Most bluebacks spawn downstream of striped bass. As many as 250,000 eggs are laid and they hatch in two or three days. Juvenile bluebacks remain in fresh water for five to six months before swimming to the ocean where they mature in about two to four years. In spring, they swim into the estuaries and up the rivers to spawn.

Alewife
Principal River: Tributaries of Albemarle Sound

Alewives are very similar to blueback herring and swim with them in mixed schools. Spawning alewives precede bluebacks by about two to three weeks in the spring. They lay large numbers of eggs that hatch in two to six days. Young fish remain in the entuaries until the fall when they migrate to the sea. Alwives are mature in about four years.

American shad
Principal river: Cape Fear River

Back in the last century, the American shad was the most valuable of all fish caught in North Carolina. Mature shad enter rivers to spawn in March and April. The females may lay as many as 600,000 eggs which hatch about three to eight days after they are fertilized. The young shad move down to the estuaries and remain their until the fall when they migrate to sea. Shad are mature in three to six years.

Hickory shad
Principal river: Neuse River

Hickory shad are caught and eaten by many anglers in the spring. Hickory shad spawn from March through May. Older females may lay hundreds of thousands of eggs. Young fish stay in fresh water through the summer and then move down to estuaries where they migrate to the sea in fall and winter. They are sexually mature when they are 2 years old.

Striped bass
Principal river: Roanoke River

Stripers spawn near the fall line on many coastal rivers around April. As many as several million eggs may be laid by each female which hatch in about two or three days while they float downstream. Males mature in two to three years; females mature in four to six years. From the Neuse River south to Florida, stripers generally overwinter in estuaries, rarely migrating to sea. In the Roanoke River, some of the stripers may spend time in the ocean while most probably stay in Albemarle Sound.

White perch
Principal River: Tributaries of Albemarle Sound

Commercial fishermen land quantities of white perch in spring, when they spawn, and fall, when they school. The white perch is considered semianadromous because it spends most of its life in brackish-water estuaries and then migrates a short distance upstream to spawn. Spawning may take place from April through June. The eggs hatch in about six days and the fish mature in from two to four years.

Strip

Tar Ri

Raleigh

Neuse River

Fayetteville

American shad

Cape Fear River

Lock No. 3

Black River

Elizabethtown

Lock No. 2

Atlantic sturgeon

Lock No. 1

Wilmin

Sport fishermen gather below the three locks on the Cape Fear each spring to catch spawning shad, beginning at Lock No. 1 and following the run upstream.

Information source: Charles S. Manooch III and Duane Raver Jr, *Fisherman's Guide: Fishes of the Southeastern United States* (Raleigh: N.C. State Museum of Natural History, 1984).

Though striped bass have always spawned heavily below Weldon, some fish may have run beyond Roanoke Rapids before the dam at Roanoke Rapids Lake was constructed.

Roanoke Rapids

Weldon

Tunis

Perquimans River

Pasquotank River

Tunis was a regional center for the herring fishery at one time. In packing houses, fillets would be salted or pickled, and the roe would be canned.

White perch

bass

Blueback herring

Businesses once closed for the rockfish run on the Roanoke. Thousands of anglers once gathered below the rapids from Weldon to Halifax to fish for spawning striped bass. This is still a favored spot despite declining numbers of fish.

ALBEMARLE SOUND

Roanoke River

Rocky Mount

Jamesville

Oregon Inlet

The Grifton Shad Festival (April 14-18, 1993) follows the peak of the shad runs on the Neuse River, Contentnea Creek and other nearby waters. It features a parade, the Shad Queen pageant, arts and crafts and sport-fishing contests.

Alewife

Contentnea Creek

Grifton

Hickory shad

PAMLICO SOUND

Hatteras Inlet

New Bern

Ocracoke Inlet

Swash Inlet

Commercial fishermen from the village of Hatteras once caught great numbers of shad and striped bass near Hatteras Inlet.

Trent River

White Oak River

Northeast Cape Fear River

ATLANTIC OCEAN

ILLUSTRATED BY DUANE RAVER JR.

KEN TAYLOR

***Avid fishermen** anchor their boats below Lock No. 1 on the Cape Fear River to fish the spring shad run.*

cal accounts that indicate the Neuse River was the most important shad-producing stream between the James River, Virginia and the St. John's River, Florida in 1896.

According to Roger Rulifson of East Carolina University, an authority on anadromous fish of North Carolina and the Atlantic Coast, the evolutionary mechanism for diadromy and its significance remain unanswered. Many scientists believe that diadromy is a relatively recent evolutionary trait, and yet the families of fishes with the greatest proportions of diadromous species are ancient in evolutionary terms. How old is this trait? No one really knows, although future research should help answer this question.

We do know that diadromy requires a fish to make complex physiological adaptations to enable it to move from a marine habitat to a freshwater habitat. To understand these adjustments, one must understand a little about the physiological problems faced by marine and freshwater fish in their respective environments. The ocean has a higher concentration of salt ions than a marine fish's body fluids, an imbalance that draws water from the fish. Marine fish thus face the twin problems of dehydration and excess salts, problems that they have solved by drinking sea water and eliminating the excess salts by urinating small amounts of water with high concentrations of salt ions.

A freshwater fish faces the opposite problem, however. Its body fluids have a higher concentration of salt ions than the water surrounding it, an imbalance that draws water into it. To cope with this problem, these fish must excrete very large volumes of urine with low or dilute concentrations of salt ions.

Thus, fish that migrate from salt water into fresh water must adjust from a condition in which they excrete high amounts of salt to one in which they conserve salt. This adjustment requires major physiological changes in the fishes' bodies—primarily the gills, kidney, gut and urinary bladder—when they change environments. Scientists are not sure when these changes take place. They may occur as the fish crosses the saltwater-freshwater boundary or they may occur more slowly during the months prior to migration. If the latter, they may in effect force the fish to make the transition. In landlocked populations, such changes aren't necessary, but no one knows for certain how fish recognize or control these adjustments.

So, why do diadromous fish go through all this? What advantage is provided to the fish that undergo a migration of this type?

Food may be a major factor. The marine environment is generally more fertile and productive than fresh water, especially in the temperate zone where anadromy is more common. However, in the tropics, the ocean is generally less productive, and catadromy occurs more often than anadromy. Indeed, diadromy may have evolved in response to aquatic productivity.

Yet, increased availability of food does not altogether explain the catadromous nature of American and European eels that inhabit the temperate zones of the Atlantic Ocean in their feeding phase. Perhaps breeding in a somewhat restricted area of the Sargasso Sea improves reproductive success by increasing the probability that mature adults from throughout a widely divergent range will get together.

Although scientists are not certain why diadromy evolved, they are more certain that spawning runs of most anadromous species are declining in North Carolina's coastal rivers. Like nonmigrating fish stocks, diadromous fish face the problem of deteriorating water quality from pollution or development that adversely affects favored watersheds. However, diadromous fish must contend with possible exposure to a degraded habitat at a multitude of sites throughout their life cycle.

Because of their widely ranging life cycles, diadromous fish are exposed to a broad array of recreational and commercial fishing pressures. Overfishing has contributed to major declines in the populations of many anadromous species. Historical records of the North Carolina shad and herring fishery suggest that overfishing may have been a contributing factor in the decline of the American shad fishery in Albemarle Sound as far back as the 1870s.

Diadromous fish are also affected greatly by alterations of the physical habitat that may act as barriers or impediments to upstream migration. Dams without fish ladders are the most obvious barrier, but they may include channelization, alteration of river flows, road construction (especially culverts) and industrial intakes and discharges. In the late 1980s, the U.S. Fish and Wildlife Service identified the barriers to upstream migration in the Albemarle and Pamlico sounds' watersheds. A joint state-federal effort, through the Coastal Americas program, has been initiated to work with the owners of some of these barriers to remove or alter them to provide fish passage. Elimination of these obstacles will restore some of the spawning habitat available to these fish.

By virtue of their extensive migrations, diadromous fish are under the management authority of various regulatory agencies at different points in their life cycles. When they are in inland waters, all fish are under the jurisdiction of the N.C. Wildlife Resources Commission. However, all fish in internal coastal waters (estuaries) and ocean waters up to 3 miles offshore are under the jurisdiction of the N.C. Division of Marine Fisheries, a related but separate state agency. In ocean waters 3 to 200 miles from shore, fish are under the jurisdiction of the National Marine Fisheries Service, a federal agency. Most diadromous fish also move along the coast or into the open ocean, in and out of the jurisdictions of other states and even other countries. This interjurisdictional migration makes

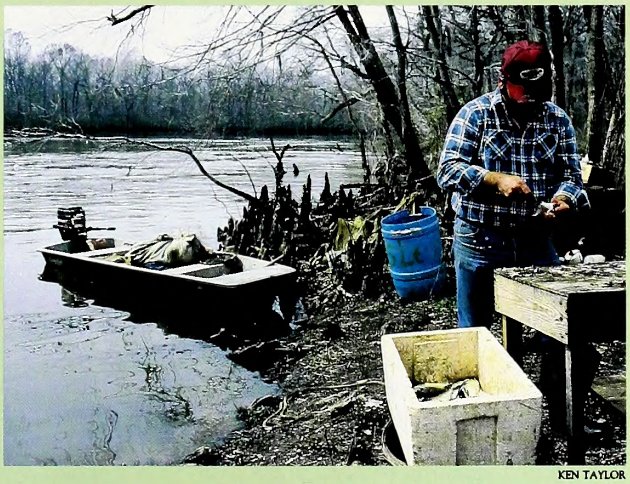
CONGENIAL RIVERS

The arrival of anadromous fish—especially shad and herring—in North Carolina's coastal rivers early each spring always draws a crowd. It's an annual event that pre-dates the arrival of European settlers because the Indians also celebrated the end of winter by spearing or netting the countless fish that spawned in these rivers. Today, with the runs greatly diminished, there are fewer fish and fishermen, yet if you know where to look, you can still find old skills and traditions largely unchanged.

Anglers gather as early as late February below the first lock on the Cape Fear River (right) to catch the big American shad on hook and line and jigs and spoons, following the run upstream through all three locks until the spawn dwindles in early May. The smaller, more common, hickory shad attracts equally rabid attention from hook-and-line anglers who gather to meet the runs at historic intersections like the mouths of Contentnea (lower right), Pitchkettle and Grindle creeks on the Neuse near Grifton. Seasonal commercial fishermen also pull their nets near Ft. Barnwell on the Neuse (lower left) or at other likely riverside spots throughout the East.

At locales like Tunis on the Chowan or Jamesville on the Roanoke, it's the herring that reigns supreme. These smaller cousins of the shad are mostly netted—though some can be caught on tiny jigs. Most are sold fresh, but at some spots, you can also buy a platter of herring grilled right on the bank or join the bustling crowd in one of the riverside restaurants that are open only during the spawning runs. The menu is always the same: slaw, hush puppies, iced tea and herring fried so crisp that they can be eaten bones and all.

KEN TAYLOR



KEN TAYLOR

KEN TAYLOR

JOHN G. SHEDD AQUARIUM

***Thriving striped bass fry** give hope that many of the problems contributing to our declining populations of anadromous fish can be addressed.*

the development and implementation of a comprehensive management program for these species very difficult.

In 1942, Congress established the Atlantic States Marine Fisheries Commission to administer the Interstate Fisheries Management Program. ASMFC consists of representatives from the member states and is responsible for interjurisdictional fishery management in the inshore waters of the states. More recently, the Magnuson Fishery Conservation and Management Act established regional fishery management councils to deal with fisheries management issues relative to interjurisdictional species. Management plans for striped bass, shad and river herrings, and Atlantic sturgeon have been developed.

In 1988, Congress reauthorized the Atlantic Coast Striped Bass Conservation Act that included a mandate for the creation of a federal-state Striped Bass Study Board. The board was led by the U.S. Fish and Wildlife Service in consultation with the National Marine Fisheries Service and included representatives from various state agencies in North Carolina and Virginia. The board identified several research and informational needs for the management of striped bass in the Albemarle Sound system of North Carolina and provided funding for many of the studies. In these studies, the catch and harvest of striped bass by sport and commercial fishermen and the survival of naturally spawned eggs and larvae were estimated. The total adult and spawning stocks were assessed, and population analysis and modeling were begun.

Many of these studies continue today. Studies of striped bass and other anadromous species in North Carolina have also been funded through the Anadromous Fish Act and the Sport Fish Restoration Act.

The next time you catch a striped bass or shad, pick a herring from a drift net, or find an eel tied in a slimy knot at the end of your line, ponder for a moment where it has been. It likely has seen more of the world than you have, and it has gone through a lot to get to you.

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Invasion of the Killer Mussels

There's another environmental disaster looming for North Carolina. If—or when—zebra mussels reach our waters, we could have real troubles.

by Barbara Doll and Jeannie Faris

GREAT LAKES SEA GRANT

***Zebra mussels will grow** on almost anything, even each other. Because they do so in such astounding numbers, they simply overwhelm their environment, clogging pipes, covering boat hulls, replacing native species and creating countless other problems.*

Lake Lure is the kind of mountain town that draws tourists from nearby counties and faraway states. Its crisp, highland beauty caught the eye of directors of the box-office smash *Dirty Dancing* and they filmed part of the movie there. Lake Lure's winding roads are lined with shops and restaurants. Around the bend, nearby Chimney Rock and Bat Cave beckon to visitors. There's inner-tubing on the river and fishing, boating and skiing in the lake.

Lake Lure was formed by a dam on the Broad River 65 years ago, and each summer the town's permanent population of 1,000 swells to 25,000. But water recreation—a cornerstone of the tourism-based economy—was threatened last August when boating was restricted by a worried town council. And what could cause such concern? How about an obscure, nonnative species of freshwater mollusk named the zebra mussel.

Even though the zebra mussel hasn't been documented in any of North Carolina's rivers, lakes streams or estuaries, the news of its costly forages through the Great Lakes have preceded it, prompting the Lake Lure Town Council to take what some consider a drastic action. The council voted to terminate the sale of boating permits on the 1,500-acre lake for the final four months of the year. This measure sent tremors through the Lake Lure business community that relies on tourism for a living—resort owners, commercial fishermen and campground owners.

"Most local people have businesses that are dependent on tourism," says Cindy Simms. who owns Lake Side Pizza. Gale Walker, a lakefront campground owner, is another concerned businessman. He figured he would lose customers to the council's ban on new boating permits. "The biggest reason people come here is to use their boats on the lake," he says.

Walker and Simms quickly joined a core of local business owners intent on learning more about the mysterious mollusk jeopardizing their livelihood in this second-home and retirement community. They learned that the zebra mussel poses a threat, among other reasons, because it is an exotic species. It is native to the Black, Caspian and Aral seas in Central Asia, and was probably introduced into Lake St. Clair near Detroit, Mich., in the mid-1980s when European ships discharged ballast water.

In the seven years since, this diminutive troublemaker has spread to several river systems, including the Hudson, Ohio, Illinois, Tennessee, Mississippi and the Susquehanna, the latter a tributary to the Chesapeake Bay. In these areas, and especially the Great Lakes, the tiny, striped zebra mussel has caused unprecedented damage to boats, piers, pilings and marker buoys. It is capable of reproducing at rapid rates and colonizing on just about any solid surface in the water, sometimes sinking buoys and floating docks.

Even more menacing, however, is the zebra mussel's tendency to colonize in the water intake pipes of power plants, water-treatment facilities and other industrial and agricultural intakes. The mollusk prefers to live in flowing water, which makes intake pipes an ideal habitat. As a result, pumping capacity can be diminished and the drinking water can take on a foul taste from mussels that die.

In Lake Lure, the town council believed circumstances unique to the area would make the lake vulnerable to attack. The group grappled with the possibility that zebra mussels could invade the lake and colonize the sewer lines underneath it or encrust the nearby intake lines of a hydroelectric plant. The town sells hydroelectric power to Duke Power Co. as a source of revenue.

"We have an unusual situation here in that the town owns the entire lake and dam," says councilman Jack Powell, who co-chairs the town's zebra mussel committee. He became concerned after reading a short article on the mollusks in *Wildlife in North Carolina*. Although zebra mussels have not been known to colonize waste-water facilities, Powell says council members feared that because their cracked sewage collection lines take on lake water, the diluted waste would

be a suitable habitat for the mollusks. This would result in the malfunction of the sewage-collection system. The lines are pressurized, however, so that waste does not leak into the lake.

The town council also feared that boat traffic from other states, where infestation has already occurred, would make the lake a sitting target for a North Carolina invasion. Time-share owners travel from states such as Michigan, Ohio, Illinois and Indiana to vacation at the lake and launch their boats from its 27-mile shoreline. Zebra mussels can be transported from infested waters on fishing gear, equipment and boats. Water currents, birds and other animals can also carry them.

"Zebra mussels have clogged city water pipes in Michigan, closing schools, industries, restaurants and bars."

Stories from cities such as Monroe, Mich., did not ease the council's discomfort. There, a water-treatment plant serving 40,000 customers lost its pumping capacity because of a zebra mussel invasion. The mussels at the Monroe Water Treatment Plant had been discovered on Jan. 29, 1989. Not long after, a 10-inch layer of mussels was found on the floor of a plant chamber that had been emptied of water. Nearby, a 3- to 4-foot layer was found at the chamber's entrance. By Labor Day, the plant had lost suction of its raw water pump chamber, but the worst was yet to come. In December, during extremely cold weather, the plant's 6,100-foot intake pipe closed as a result of an unfortunate combination of events that included zebra mussel colonies, calm seas and very cold air temperatures. The result was a complete loss of pumping capacity for a period of 56 hours.

"They closed schools, industries, restaurants and bars until the plant recovered its reserves," says Wilford LePage, superintendent of water treatment for Monroe. One couple reluctantly had to cancel their wedding reception. In spring 1990, plant officials mechanically cleaned the entire length of the intake line to remove all attached zebra mussels. The task was expensive and time-consuming since the line is 30 inches in diameter and extends 5,000 feet offshore. A chlorination system was installed to prevent future encrustation.

Zebra mussels are more than a menace to water supplies, however. They can also vex people who want to enjoy a day on the water or at the shoreline. Attached to boat hulls, they increase drag, which slows speed and increases fuel consumption. The immature larvae, called veligers, can be drawn into an engine's water intake and obstruct the cooling system if they are allowed to mature, leading to overheating and possible engine damage. In the Great Lakes, storm waves occasionally wash the shells from submerged colonies onto beaches. Beachgoers have had to wear footgear to prevent cuts from the sharp shells. And when the mussels decompose, they can produce obnoxious odors.

Zebra mussels also pose significant ecological impacts for native mussel and fish populations in North Carolina. "I'm most concerned about the potential impact zebra mussels have to native mussels and other fauna," says John Alderman, a nongame biologist for the N.C. Wildlife Resources Commission. Many others share his concern.

Zebra mussels, like other mussel species, are filter feeders. An adult filters an average of one liter of water per day, removing very small plants and animals known as phytoplankton and zooplankton for food. Native mussels can be edged out of an area by competition for food if the zebra mussel colonies become as extensive as those in some areas of the Great Lakes. They have also been found attached to other mussel species, even crayfish, smothering or restricting the unwilling host's movements.

The U.S. Fish and Wildlife Service projects that at least 20 freshwater mussel species will become extinct if the zebra mussel establishes itself in reservoirs and large rivers throughout most of the eastern United States. That count will be even higher if it settles in mid-size and smaller rivers. In North Carolina alone, 13 of 60 freshwater mussel species could be wiped out. Of those, four species—Roanoke slabshell, Waccamaw spike, tidewater mucket and Appalachian elktoe—live almost exclusively in North Carolina, and they could become extinct altogether. The native mussels may also be damaged by human efforts to control and prevent colonies of the zebra mussel. Furthermore, small fish that need a steady diet of phytoplankton could be squeezed out by the competition for food. As a result, the larger fish up the food chain may suffer as well.

These and a host of other questions about the zebra mussel remain unanswered. Will it reach North Carolina fresh waters and, if so, when? Will it survive in our extensive estuaries and, if so, what effects will it have on these very complex natural systems? Some scientists believe that the zebra mussel has the potential to invade most North American waters—it's just a matter of time. In North Carolina, the most pessimistic forecast is less than two years. Other experts, however, believe the zebra mussels will never prolif erate in North Carolina as they have in the Great Lakes.

***If zebra mussels become established** in North Carolina, they are likely to threaten other aquatic forms of wildlife, especially native mussels. Chris McGrath, a nongame biologist for the Wildlife Commission, searches for rare, native mussels in the Cane River.*

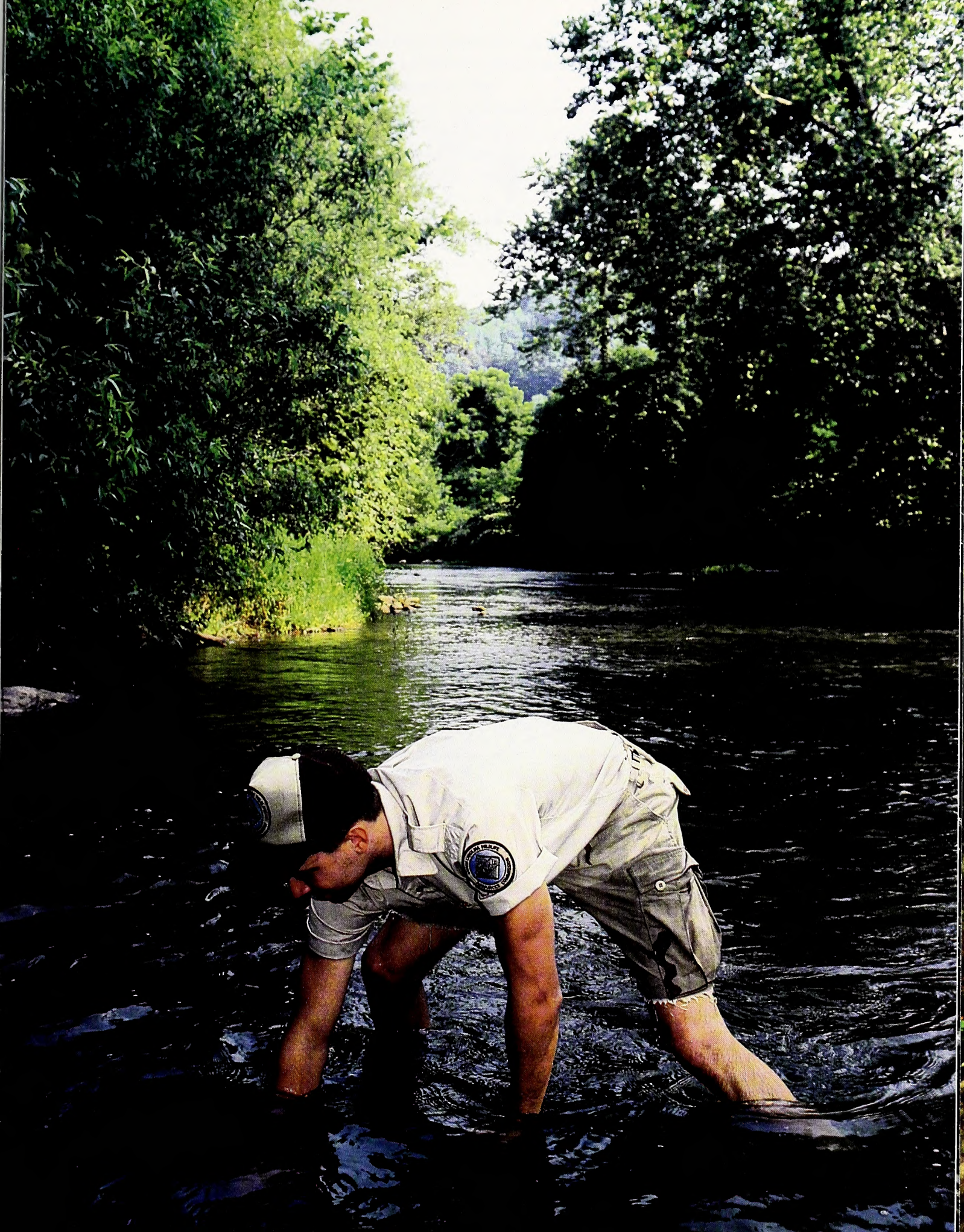
"Conditions in our lakes are not ideal for the zebra mussels," says Sam Mozley, an associate professor of zoology at N.C. State University. "However, this does not rule out the possibility of their coming here.

Research has shown that the zebra mussel is a hardy species, able to survive in a broad range of environments. Although it is a freshwater species, it has been observed to live in salinities of up to 10 parts per thousand (ppt). This would encompass a large portion of North Carolina's estuaries. Only recently, the mussel has been found colonizing areas in the Hudson River estuary where salinities are 3 ppt and higher. Scientists have also established that the mussel can tolerate water temperatures from 59 to 80 degrees, which would cover a large portion of North American waters, but water temperature and salinity are not the only ingredients for a zebra mussel habitat. There are chemical and environmental parameters such as calcium content of the water, acidity, oxygen concentration, water velocity, turbidity and availability of suitable surfaces for attachment. Currently, the town of Lake Lure is taking water samples to test in hopes of learning whether the water is favorable.

At present, there is no way to remove an established zebra mussel colony without harming other species. So once they're here, experts can only try to minimize their ecological and economic impacts with known control measures. Still, there is no single solution that can be used in all cases.

North Carolina towns like Lake Lure—and the Chesapeake Bay to the north—will benefit from ongoing research and other areas' experiences with the nonnative mollusk. In the meantime, it is important to focus efforts on slowing the spread of zebra mussels to North Carolina. One thing we already know about zebra mussels. We don't want 'em. ☐

For more information, contact Barbara Doll at UNC Sea Grant at 919/515-2454.



A Catfish Named Hopkins

"One day, Hopkins gave a real strong flip of his tail and landed on the table at the empty place. Momma didn't say a thing. She just put some butter beans and rice and gravy on the plate."

written by M. G. Baldwin ©1993

illustrated by Jackie Pittman ©1993

I'll swear, Lilla, I could read fine print through them ham slices. Not that I ain't grateful, mind you." Uncle George—actually, he's my great-uncle—had come in the kitchen a few minutes earlier and Grandmother was fixing him breakfast. It was the first time we'd seen him since summer.

The sun had just popped over Uncle Will Gibson's barn—he's not my uncle either, you understand. He's not even related, but everybody in Hope Landing is uncle, aunt, cousin to everybody else, whether they're really kin or not. That morning frost was so thick on everything it looked like snow, and the sun would almost blind you if you looked that way. I had finished my breakfast but was still in my place near the wood stove, the warmest spot in the whole house.

Grandmother looked at Uncle George but didn't say anything, just finished carving a few more slivers from what little was left of that ham we'd been eating for breakfast for as long as I could remember. That old ham was mostly now just bone and brown greasy skin with greenish mold growing on it, but Grandmother could still find enough bits of dark red meat to make her frying pan smell better than anything in the world. She wiped the kitchen knife, a wicked-looking long thin blade sharpened away to almost nothing in the middle, and refilled Uncle George's coffee mug.

"Where you working these days, George?" she asked. "You going to be around a spell this time?"

"Over in Tennessee, across the mountains, little place called Oak Ridge. Biggest project I ever seen, Lilla. Must be thousands of people working there, and nobody knows what we're building. Actually somebody must know, but it sure ain't us that's doin' the work. My foreman says it's gonna be a plant to make some kind of new airplane gasoline for the war. I won't be here but a couple of days. Had trouble gettin' that much time off."

I was always a little scared of Uncle George. He's tall and skinny and always needs a shave and a haircut. His hair is almost white and his skin looks like my old baseball glove, only more wrinkled. Uncle George most of the time ignored me, which suited me fine, but sometimes he'd squint my way with eyes the color of the morning glories out on the chicken house. He always just called me Boy. I thought back then he didn't know my real name, but I realize now it was just his way. He knew all about me.

This morning he looked up from his grits and eggs and ham sliver. "Been fishin' lately, Boy?"

"Yessir. Caught a catfish down at Uncle Wally's pond. Grandmother cooked it for supper."

"Pond catfish're OK to eat but other than that they ain't worth diddly. They're dumb, almost dumb as chickens. You take a catfish from the swamp, now that's another matter. Some of the old ones—you know a catfish can live a thousand years—are smarter than a dog. Smarter than some people I know. You don't usually catch one of them old ones, of course, but sometimes they get lazy and you haul one in."

"Now, George, we haven't got time to waste on one of your tales." Grandmother cleared away Uncle George's plate and poured more coffee in his mug.

"This ain't no 'tale', Lilla. It's the Lord's truth, but it's right sad. You want to hear about the smartest catfish ever come out of the swamp, Boy?"

"Yessir." I saw Grandmother give Uncle George a look but he leaned back, sipped his coffee and started in. Uncle George scares me, but I love his stories.

"It happened a good few years back, when I was about your age as I recall it now, 'bout this same time of the year. Poppa had gone down to the river for catfish and he took me along to bait the hooks. We used setlines, tied 'em to tree limbs out over the water, baited 'em with pieces of chicken, dough balls, whatever we had.

"Settin' the lines was my job. You ever had somebody paddle you right up in the bushes at the edge of the river, Boy, right into where the spider webs're so thick they almost drag you outta the boat? Where there's probably a water moccasin on every limb you pass under? That ever happen to you?"

"No sir."

"Then you're lucky. Well, we set the lines one afternoon late then slept the night in the wagon back at the landing. Next morning when it was just light enough to see we got back in the boat. It was cold as a. . ." Uncle George looked at Grandmother, who frowned and shook her head.

"Well, it was real cold. Poppa would paddle up to each line and most every one had a catfish on it. I could tell how big they were by how much the limb jerked up and down. Some of them cats took both hands to pull 'em in the boat. Some of them babies was big as I was. And mad. . . they'd just as like eat me as look at me.

"You think Poppa took those fish off the hooks for me, Boy? Oh, no. He just set back at the end of the boat and smoked that old pipe of his and watched. Kept telling me to hurry up. I practically had to rassle some of

them cats in, but I finally got 'em all in the wash tub we'd brought along. How 'bout some more coffee, Lilla? Just thinking about that morning makes me cold all over again."

Grandmother filled up his cup then went back to washing dishes, but I could tell she was really listening to Uncle George.

"Well, we took that tub home and put it out under the smokehouse shed then went in the house and had breakfast—it was good, Lilla, but not a bit better'n the one you just gave me."

"Of course, George. I'm your little sister, remember. I must have been there. I must remember the whole thing, right?"

"Oh, yeah, I keep forgettin'. It's a wonder you haven't already told Boy here about pore Hopkins, but let me go on. Did you clean the catfish you caught at the pond, Boy?"

"No sir, but I watched Grandmother. I think I know how now."

"Then you know you stick your thumb in their mouths to hold 'em then skin 'em, gut 'em and cut off their heads, all the time watching out for their stinging spines. There was gonna be a big fish fry over at the church that night and Poppa had said he'd bring the fish. That's why we went to the river in the first place.

"When we'd got all finished cleanin' them cats and got the tub rinsed out I heard a rustlin' in the leaves over under the scuppernon' vine, and what do you think was doin' the rustlin'?"

"I don't know."

"It was a catfish, one about long as your arm. I went over to get him—actually, I can't really say if it was a him or a her, but it acted like a him. That fish flopped away from me so fast I had to hurry to catch up, but I got him and brought him back. Poppa said to fill up the tub and put him in the water, he was tired of foolin' with catfish. I guess that's where this story really starts.

"For the rest of that day every time I went by the tub the catfish would be gone. Sometimes he'd be close and I'd grab him and throw him back. Other times I'd have to hunt, once all the way behind the barn. Never saw nothin' like it.

"That evening when we was all settin' on the porch after supper, we heard the chickens get all in a ruckus. We'd been troubled with a fox so Poppa grabbed up his 12-gauge and ran out to the chicken yard, me right behind him. We didn't see no fox. What we did see was that catfish crawled up in the feed trough havin' his dinner, calm as could be. He'd take a bite of chicken mash, chew awhile, then take another bite. And I'll swear to this day he looked at me once and smiled."

"Geoooorge..." Grandmother had come over and pulled up a chair at the table.

"It's the truth, Lilla. You must remember.... Anyway, we just stood there and watched, not hardly believin' our own eyes. After a few minutes brother catfish must have got enough, 'cause he climbed out of the trough and walked—'walking' was the best way to describe how he moved on his front fins—back to the tub and flipped himself in.

"Poppa thought about it a while and we carried the tub in the house and put it in the middle of the kitchen. I crumbled up some old cornbread and put it in a saucer by the tub. When the water got still Momma leaned over real close and gave our fish a good hard look.

"His face kind of reminds me of that preacher we had at revival last year, Preacher Hopkins, she said, and that's how our catfish got his name, Hopkins.

"Now, Boy, I ain't got time to tell you how Hopkins grew to be the pet of the family. Let me just say, like I said earlier about catfish, he was smart as a lot of people you're gonna meet, and a whole lot nicer. We kept his tub in the kitchen so whenever he felt like it he could hop in for a swim. His swims got seldomer and seldomer, though, til pretty soon he didn't need to ever be in the water, except for his Saturday night bath like the rest of the family, of course. We just took the tub away and Hopkins fixed himself a bed in the kitchen corner behind the brooms.

"At first he'd eat out of a bowl Momma put in the corner by the stove, but then he started to come in the dining room when we were having dinner. He'd just sit quiet-like and watch us, his eyes moving from one to another, his whiskers twitchin' now and then. I'd sneak him a little piece of chicken or whatever when Momma wasn't looking.

"Actually, I think she saw me, but she didn't really mind. She'd gotten to love Hopkins like the rest of us loved him. He was always polite, and he'd learned to help Momma clean the floors—he'd crawl back under

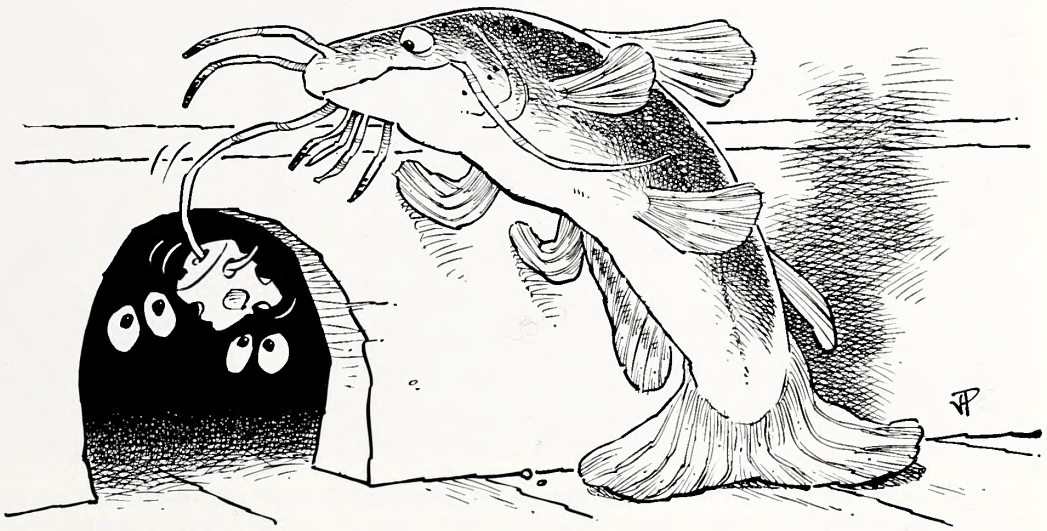
tables and such where it was hard to get with a broom and sweep out the dust with his tail. Every now and then he'd catch a mouse back in those dark places."

"What did he do with the mice?"

"Don't rightly know. Leastways if he ate 'em he done it in private so's not to upset Momma. One day, when there was an empty place at the table for some reason, Hopkins gave a real strong flip of his tail and landed on the table at the empty place. Momma didn't say a thing. She just put some butter beans and rice and gravy on the plate. From then on Hopkins ate at the table like the other members of the family. . . .

"Boy, I got to go. In fact I wish I didn't have to tell you the end of this at all, but you're old enough to take the bad with the good, ain't you?"

"I think so, Uncle George."



"Well, we had a picnic down to the river one Sunday afternoon, the whole thing in honor of Hopkins. The reason we was honorin' him was this: earlier in the week he'd been minding the baby—that's your Aunt Ola. You ask her about it sometime. Hopkins and the baby were in the front yard out by the swing when this big ol' hound dog come up, terrible black thing used to belong to old man Goudge down by the tracks. That dog was meaner than a cottonmouth with a run-over tail. Momma heard it growl and was running around the house with a hoe when the dog jumped toward little Ola.

"Momma screamed just as Hopkins took over. He flipped up in that hound's face, slapped him a good one with his tail and somehow managed to sink his stingin' spine in his neck. If you ever been finned by a catfish, Boy, you'll know how that dog felt. Well, it managed one bite on Hopkins tail then took off and was never seen again.

"Momma put a bandage on Hopkins and fixed his favorite supper, scrambled eggs and grits, and tucked the pore thing in his little bed. That night Poppa announced we'd go to the river and have a picnic, all because of what that brave catfish had done."

"Geoooorge. . .,"said Grandmother.

"I got to go, Boy. I hate like everything to tell you the rest of this, but you ought to know what happened. During the picnic your Grandmother, who was a real spunky little thing even back in those days, decided we ought to take Hopkins for a boat ride. I know she's not proud of what happened next. She'll probably tell you she don't remember, and I can understand why.

"I paddled out in the current, aiming to go up to old Moss Turnhole and then drift back. She had Hopkins in her lap in the front of the boat. All of a sudden a moccasin dropped off a branch a little ahead of her, and you know how girls are about snakes. . . .

"She jumped up. Almost tipped the boat over, but that was nothin'. Hopkins, who had been dozin' and wasn't ready, fell out of the boat when she stood up. I tried to grab him but missed, and that pore catfish went in the water and sank. We could see him, strugglin' as he went down and down 'til he was out of sight. . . . A couple hours later we found him washed up by a log downstream."

"Was he OK when you found him?"

"No, Boy, he wasn't OK. Good, brave Hopkins was dead. All limp and cold, his eyes still open like he was lookin' for his family, but it was too late."

"What had happened to him?"

"Why, Boy, that pore catfish had been on land so long he'd plumb forgot how to swim and breathe in the water. He just plain drowned." ⊠

Dollars Dropping to Fund

Contributions Important for Nongame Wildlife Program

Written and Edited by Vic Venters

The time for filing 1992 tax returns is right around the corner. And making a contribution toward improving the habitat, management and propagation of nongame and endangered species can be as simple as writing in an amount in the proper space on the state tax form.

Unfortunately, fewer and fewer people are now donating to the N.C. Wildlife Resources Commission's Nongame and Endangered Wildlife Program. Contributions for the first six months of the 1992-93 fiscal year total $240,000 and Commission officials have predicted a decrease in contributions for the period. "Our income tax contributions are down about 20 percent," said Randy Wilson, manager of the Wildlife Commission's Nongame and Endangered Wildlife Section. "We anticipate contributions of about $340,000 for the fiscal year."

If this prediction is accurate, it will represent a decline in contributions of over $140,000 from 1989, when donations to the program peaked. That year, for instance, 48,220 people contributed about $486,525; in 1991, the number of contributors dropped to 40,642 while donations dropped to about $407,998.

This decline in contributions follows similar trends in many other states with nongame programs. "If this downward trend continues, it could have a major impact on our ability to manage North Carolina's nongame and endangered wildlife programs," Wilson said.

Contributions from the public have financed some of the Nongame and Endangered Wildlife Program's better known projects, including a sea turtle monitoring network, peregrine falcon restoration in the mountains, flying squirrel research, a colonial waterbird nesting-protection program and monitoring a resurgent bald eagle population.

Two of the latest projects to involve the Wildlife Commission's nongame biologists are a pair of biological surveys, currently being conducted, of the Croatan and Uwharrie National Forests. Biologists are surveying the forests for land and aquatic snails, freshwater mussels, crayfish and small mammals.

KEN TAYLOR

***Peregrine falcons are** one of the many species of wildlife that the Nongame Program has worked to restore in North Carolina. Citizens may support the management and protection of nongame wildlife by contributing to the N.C. Nongame and Endangered Wildlife Fund on state tax returns.*

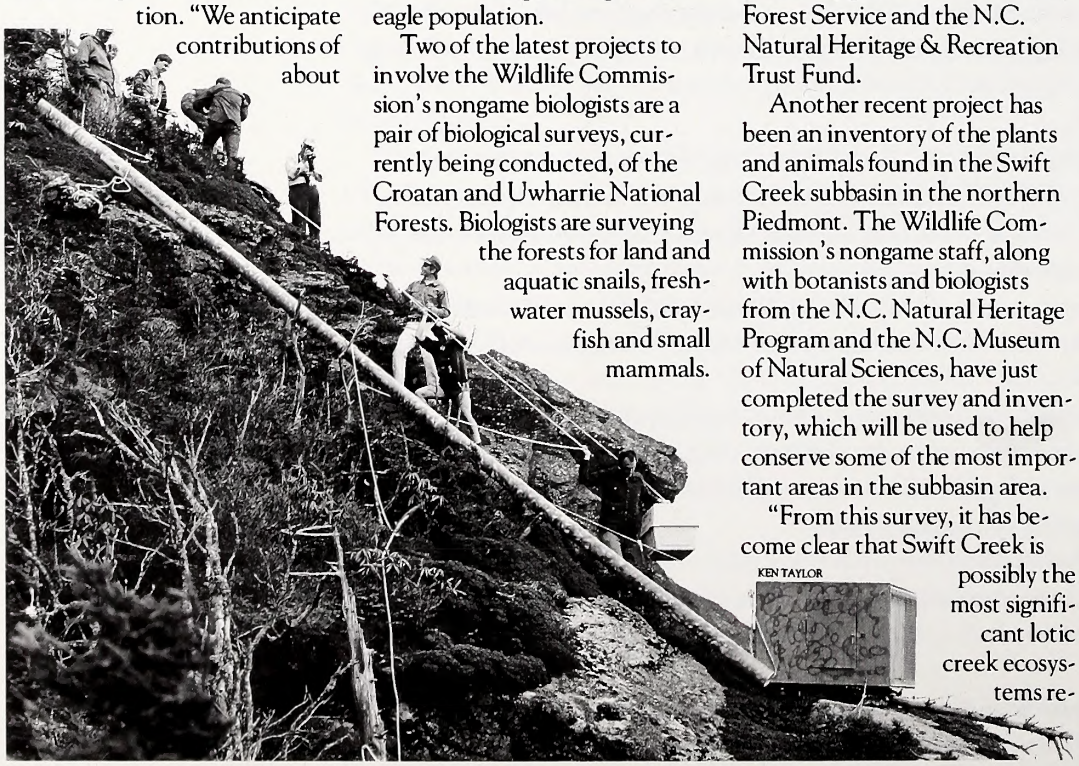
Increased knowledge of the biologically significant areas in the forests will enable the U.S. Forest Service to manage its lands better. The project was also funded by grants from the U.S. Forest Service and the N.C. Natural Heritage & Recreation Trust Fund.

Another recent project has been an inventory of the plants and animals found in the Swift Creek subbasin in the northern Piedmont. The Wildlife Commission's nongame staff, along with botanists and biologists from the N.C. Natural Heritage Program and the N.C. Museum of Natural Sciences, have just completed the survey and inventory, which will be used to help conserve some of the most important areas in the subbasin area.

"From this survey, it has become clear that Swift Creek is possibly the most significant lotic creek ecosystems remaining along the Atlantic Seaboard," explained John Alderman, the Commission's nongame project leader in the Piedmont. "Its high species diversity, presence of numerous species that don't tolerate pollution and number of endemic and federally listed species all increase the importance of conserving this creek for scientific understanding and for society in general."

"Our hope is that taxpayers will keep in mind the impact their contribution can have on this program," Wilson said. "The check-off contribution to the Nongame and Endangered Wildlife Program provides the major financial support for these programs. And the contributions are also deductible on federal income tax returns."

—Bodie McDowell and Vic Venters



KEN TAYLOR

***Nongame biologists** and volunteers install a hacking box for peregrine falcon reintroduction on a steep slope at Grandfather Mountain.*

Pilot Project on I-40

Roadside Wildlife Habitat Program Unveiled This Winter

This winter, the N.C. Department of Transportation unveiled the first of its new roadside wildlife habitat-improvement projects. The pilot program, located along I-40 between Orange and New Hanover counties, includes reduced mowing behind the ditches in the selected project areas.

This will create brushy grassland conditions, providing more food and cover for wildlife. In addition, mowing heights and schedules of the outer fringe areas have been adjusted to better fit the needs of wildlife. Signs will be located along roads featuring wildlife habitat areas.

The habitat program will help some of the state's declining species such as bobwhite quail, eastern meadowlarks, cardinals, prairie warblers and cottontail rabbits by adding breeding areas, food and cover near the roadside. The N.C. Wildlife Resources Commission assisted the Department of Transportation in developing this program.

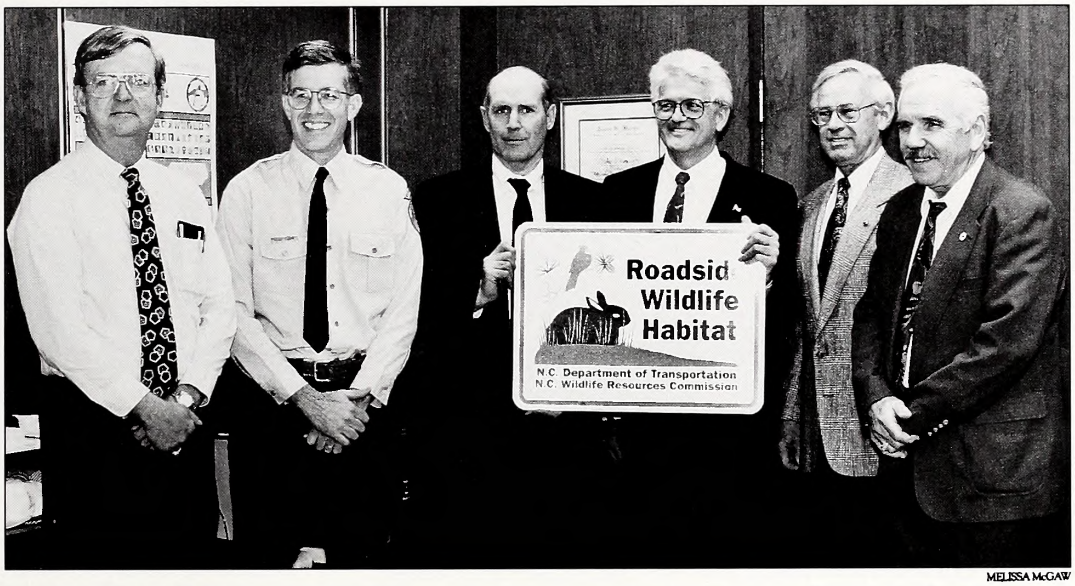
Studies have shown that smaller wildlife species tend to travel parallel to the roads rather than across them. The Department of Transportation has also avoided planting the types of food or cover that would attract larger animals such as white-tailed deer. Care has also been taken to develop wildlife cover in portions of the right-of-way away from the pavement and in areas where the driver's view is not obstructed.

"From an educational standpoint the program may provide the public with a better understanding of the value of maintaining grassland or brushy habitat for wildlife," said Terry Sharpe, the Wildlife Commission's small-game project leader. "The same concepts of reduced mowing that are used on roadsides also apply to mowing management on private lands. It's important to note, however, that reduced mowing doesn't mean no mowing. Properly timed mowing still needs to be conducted to prevent grassland areas from growing up in trees."

Developing improved wildlife helps many species of wildlife, but it can also reduce some of the long-term mowing costs to North Carolina citizens.

For more information on the Roadside Wildlife Habitat Improvement Program, contact the Roadside Environmental Unit, N.C. Department of Transportation, P.O. Box 25201, Raleigh, N.C. 27611.

—Information courtesy of N.C. Department of Transportation



MELISSA McGAW

This winter the N.C. Department of Transportation *unveiled its first Roadside Wildlife Habitat Improvement project along I-40. Reduced mowing along selected highways will improve wildlife habitat. These areas will be identified by signs pictured above. From left to right are: Bill Johnson, director of DOT's Roadside Environmental Unit; Terry Sharpe, small-game project leader for the Wildlife Commission; Richard P. Budd, chairman of the Wildlife Commission; Thomas Harrelson, former secretary of DOT; Bill Marley, DOT's state highway administrator; and Wayne Bailey, DOT's chief engineer of operations.*

Look for Leg Bands

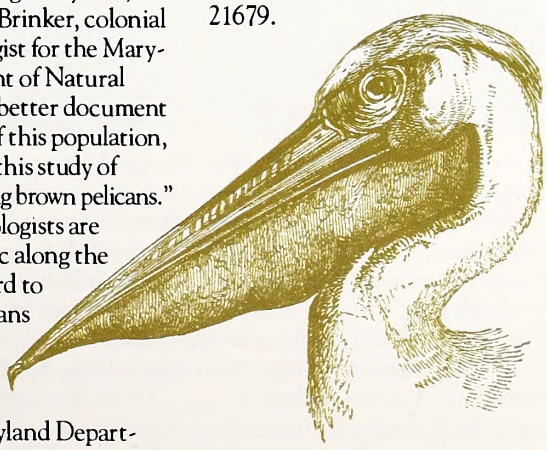
Report Blue-Banded Pelicans

Pelicans are no longer a rare sight along the North Carolina coast, but those with a blue leg band may be.

Last year, researchers in Maryland tagged 32 fledgling pelicans with blue plastic leg bands in order to learn more about the dispersal patterns of these birds. From 1987 to 1992, Maryland was the farthest north that pelicans bred on the Atlantic Coast. Birds from North Carolina have been tagged with a red band.

"In past years, fledglings have been reported from as far north as Long Island to as far south as northern Florida within four months of leaving Maryland," writes David F. Brinker, colonial waterbird biologist for the Maryland Department of Natural Resources. "To better document the expansion of this population, we've initiated this study of Maryland nestling brown pelicans."

Maryland biologists are asking the public along the Atlantic seaboard to report any pelicans with a blue leg tag. Report sitings to David F. Brinker, Maryland Department of Natural Resources, P.O. Box 68, Wye Mills, MD 21679.



Easton Waterfowl Festival Donates $25,000

Habitat Help at Roanoke River Wetlands

Since 1988, the Waterfowl Festival of Easton, Maryland, *has donated $111,750 to the Wildlife Commission for habitat work in the Roanoke River Wetlands complex. In December, Festival board members traveled to the area to review work on the project.*

Some of North Carolina's most important wetlands areas are being preserved, thanks to the Waterfowl Festival Inc. of Easton, Maryland. Since 1988, the board of directors for the Festival has donated $111,750 to be used in the N.C. Wildlife Resources Commission's Roanoke River Wetlands complex. This project encompasses about 11,000 acres in the recently formed Roanoke River National Wildlife Refuge, managed jointly by the Wildlife Commission and the U.S. Fish and Wildlife Service.

Last year alone, the Waterfowl Festival donated $25,000 for habitat development, surveys and land acquisition. This money is used to supplement state funds for habitat management in the Roanoke River Wetlands cooperative effort. Members of the Waterfowl Festival board traveled to the area in December to review the project.

"The Waterfowl Festival has been one of the original contributors for saving this critical wetlands area," said Hal Atkinson, chief of the Commission's Division of Wildlife Management. "The Festival has been supporting us since this was a small project and has seen it become part of a national wildlife refuge. The Festival deserves a lot of credit for having the foresight to look beyond geographical boundaries and recognize the importance of these wetlands."

The hardwood bottomland wetlands along the Roanoke River have been recognized as critical wintering habitat for migrating waterfowl, and the wetlands are also home to many other migrating birds and rare and endangered plant and animal species. The Roanoke River National Wildlife Refuge was created in 1989 and will eventually preserve about 33,000 acres of wetlands habitat.

From Russia With Love

Dear Friends:

Many thanks for the August issue of *Wildlife in North Carolina*. My English, or maybe American, is now enriched by many words, specific for the wildlife, fishing and hunting. I'm delighted with the photographs and the wonderful nature of North Carolina, advantageously stressed by the panorama wide-angle snapshots.

Unfortunately, having the official income of about $1 a day, I can't afford the subscription to your magazine, but I remain to be your fervent admirer forever.

—Vladimir Baronov
Microdistrict Davydovsky
Kostroma, Russia

Editor's note: In the spirit of Glasnost, staff members of Wildlife in North Carolina *purchased Mr. Baronov a subscription to the magazine. We hope his English continues to improve.*

Wildflower of the Year

Great Blue Lobelia Seeds Available

For the twelfth consecutive year, The Garden Club of North Carolina Inc. and the N.C. Botanical Garden are sponsoring the Wildflower of the Year Program. This year, the great blue lobelia (*Lobelia siphilitica*) has been selected as the Wildflower of the Year.

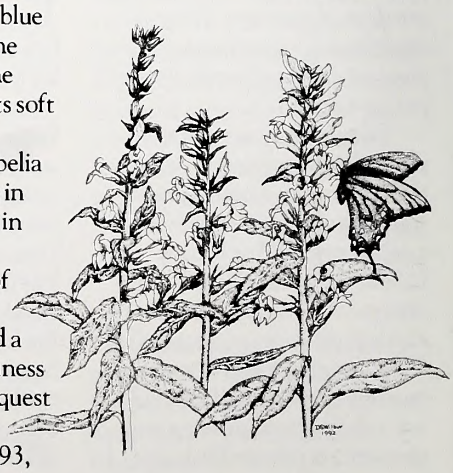
Great blue lobelia is a 2- to 3-foot tall perennial. By midsummer it begins to develop a leafy, flowering stem. In late summer or early fall, beautiful two-lipped flowers begin to bloom. Starting at the bottom, these tightly-clustered, tubular blue flowers begin a lengthy blooming period.

Great blue lobelia is attractive when displayed with early fall asters and mums. Perennial salvias in the blue and purple range are also complimentary. Another pleasing combination is produced by planting great blue lobelia as a companion to the 1990 N.C. Wildflower of the Year, seaside mallow, with its soft pink hibiscus-like flowers.

In the wild, great blue lobelia is frequently found growing in wet meadows and low areas in both sun and shade.

To receive a free supply of great blue lobelia seeds and a descriptive brochure, send a stamped self-addressed business sized envelope with your request to: North Carolina Botanical Garden, Box WFOY 1993, CB#3375, Totten Center, University of North Carolina, Chapel Hill, N.C. 27599-3375.

—Rob Gardner



Open to the Public

Commission Sponsors Habitat Seminars this Month, April

If you'd like to have more wildlife on the land you own, hunt or lease, there's still time to attend one of the Wildlife Commission's habitat-improvement seminars scheduled for this spring.

A total of nine seminars have been scheduled, one in each wildlife district. (Dates for the four February workshops were unavailable in time for that month's printing deadline.) The workshops are part of the increased emphasis the Wildlife Commission is putting on small-game management (see "*Can We Save Small Game?*" in this issue for more information).

Each workshop will feature several experts speaking on a variety of management topics for improving wildlife populations. The workshops are weighted toward small-game management, but also include big game, turkey, waterfowl and other wildlife-management techniques. All will be held during the early evening and will last approximately two hours. Some workshops have co-sponsors and refreshments or catered meals may be available, depending on the location.

For more information, contact the Wildlife Commission's Division of Wildlife Management, 512 N. Salisbury St., Raleigh, N.C. 27604-1188, or call (919) 733-7291.

District 7
Date: March 15
Time: 7:00 — 9:00 p.m.
Location: Auditorium C, Forsyth County Agriculture Building, Winston Salem
Targeted Audience: Small landowners
Topics: Enhancing quail habitat on small farms, managing openings and woodlands management.

District 6
Date: March 16
Time: Evening
Location: Cooperative Extension Service Building, Wadesboro
Targeted Audience: Landowners and sportsmen
Topics: Dove life history, plantings and normal agricultural practices, and federal and state hunting regulations.

District 2
Date: March 25
Time: 7:00 - 9:00 p.m.
Location: Craven County Agriculture Building, New Bern
Targeted Audience: Landowners and dove hunters
Topics: Dove hunting and management, population call counts and legal aspects of dove hunting.

District 3
Date: April 1
Time: 7:30 - 9:00 p.m.
Location: Halifax Community College, Roanoke Rapids
Targeted Audience: Hunt clubs leasing industry lands
Topics: Quail management, dove management, rabbit management, wood duck management and prescribed burning.

District 5
Date: April 14
Time: 6:30 to 9:30 p.m.
Location: Guilford County Agriculture Center, Greensboro
Targeted Audience: Landowners
Topics: Small-game habitat, prescribed fire, warm-season grasses, dove-field management and hardwood management.

Wildlife Endowment Fund Report

December 1992

Principal Balance
$17,839,966.30
Interest Earned
$10,732,029.15
Total Receipts
$28,571,995.45
Interest Used
$4,123,817.48
Fund Balance
$24,448,177.97

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

Union Camp Donates 25 Acres

Commission Receives Chowan River Land

Wildlife Commissioner Maughan Hull *of Elizabeth City (right) receives deed to 25 acres of land from Union Camp Corporation's Rick Malm, woodlands regional manager, during a ceremony this fall at Shoup's Landing on the Chowan River. The land adjoins the Commission's access area near Winton and is the second land contribution by Union Camp. In 1978, the corporation donated adjacent property consisting of wetlands and hardwood timber lands to the Wildlife Commission. Malm said the 25 acres recently contributed also contains hardwood timber and wetlands.*

March is for the Birds

by Vic Venters

March can be a busy time of the year for the wildlife backyard birder, as migrating birds return from wintering locales farther south.

Boxes for Bluebirds: It's a good time to begin putting up or cleaning out nest boxes, especially for bluebirds. Plans for boxes are available from a wide variety of sources. It's a good idea to place bluebird boxes at least 100 yards apart to prevent territorial fighting by any neighboring bluebirds. Boxes should be placed on poles in open grounds such as large lawns or pastures.

Predator guards should always be incorporated to prevent snakes or other predators from raiding the nest. If you're building your own boxes, try to incorporate a hinged side or hinged top door so that nesting efforts can be monitored on a regular basis and the boxes cleaned after nesting.

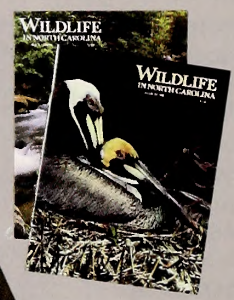
Recycling eggshells: Purple martins thrive on relatively high levels of calcium and grit, and they are especially needed when raising broods. If you have a martin house or gourds, you can supply your colony with a readily available source of calcium and grit by providing crushed chicken eggshells.

To properly prepare your eggshells, wash any of the egg residue off, then allow to dry in the sun or in a warm oven. Once dry, the eggshells can be crushed and stored in a ventilated container. The best way to feed martins eggshells is from an elevated platform located near your colony. An elevated platform will prevent predation from housecats. An excellent source of information for purple martin fanciers is the Purple Martin Conservation Association. This organization publishes a full-color quarterly magazine packed with the latest techniques for managing your purple martin colony. To contact, write Purple Martin Conservation Association, Edinboro University of Pennsylvania, Edinboro, PA, 16444.

Fruit for Fowl: It's a good time to plant a variety of fruit-producing trees this month for birds and other wildlife. Fruit-producing trees with excellent benefits for wildlife include crab apple, plum and dogwoods. Many songbird species such as cedar waxwings, cardinals and bluebirds are especially attracted to cherry trees. For more information on what varieties to plant, contact your local nursery.

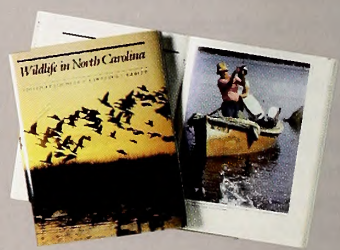
The N.C. *Wild* Store

Take advantage of these great items and you'll support conservation education throughout North Carolina. Proceeds from the sale of these publications will support the development and production of educational projects and programs.



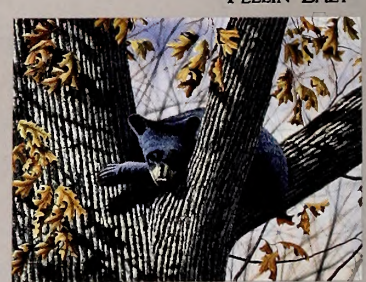
Wildlife in North Carolina Magazine

M2. *Wildlife in North Carolina* Magazine Binder



M3. *Wildlife in North Carolina* Book

P1-P2. N.C. WILD Art Print "Feelin' Lazy"



N1-N5. Wildlife Habitat Art Prints

W1. *All Things Are Connected* (video)

W2. *This Land Is Sacred* (teacher's guide)

W3. *All Things Are Connected & This Land Is Sacred*

W4-W5. *Wildlife Profiles* Sets

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To order any of the following materials, complete the educational materials order form (lower right).

ITEM CODE

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M3. *Wildlife in North Carolina* Book. The best of *Wildlife in North Carolina* magazine. **$12.**

Wildlife Habitat Art Prints:

Various artists. **$25** ea. (Add $5 shipping and handling per order).

N1. "Forest Life of the High Peaks"
N2. "Colony-Nesting Waterbirds"
N3. "Sandhills Longleaf Pine Forest"
N4. "North Carolina Creeks"
N5. "North Carolina Beaver Ponds"

N.C. WILD Art Print:

"Feelin' Lazy" by Robert Flowers.

P1. Limited-edition print. **$45.**
P2. Artist's proof. **$65.**

Chief Seattle Materials:

W1. *All Things Are Connected.* 12-minute video uses the words of Chief Seattle to introduce environmental ethics. **$20.**

W2. *This Land Is Sacred.* Teacher's guide accompanies the Chief Seattle video. **$4.50.**

W3. *All Things Are Connected & This Land Is Sacred.* Video and Teacher's Guide package. **$22.**

WILDlife Profiles:

Each set features 10 animal fact sheets.

W4. *WILDlife Profiles Set 1.* Black bear, raccoon, white-tailed deer, striped skunk, bobwhite quail, wild boar, muskrat, mourning dove, coyote, mallard. **$2.**

W5. *WILDlife Profiles Set 2.* Mink, canvasback duck, red fox, wild turkey, beaver, American river otter, Canada goose, bobcat, red wolf, cougar. **$2.**

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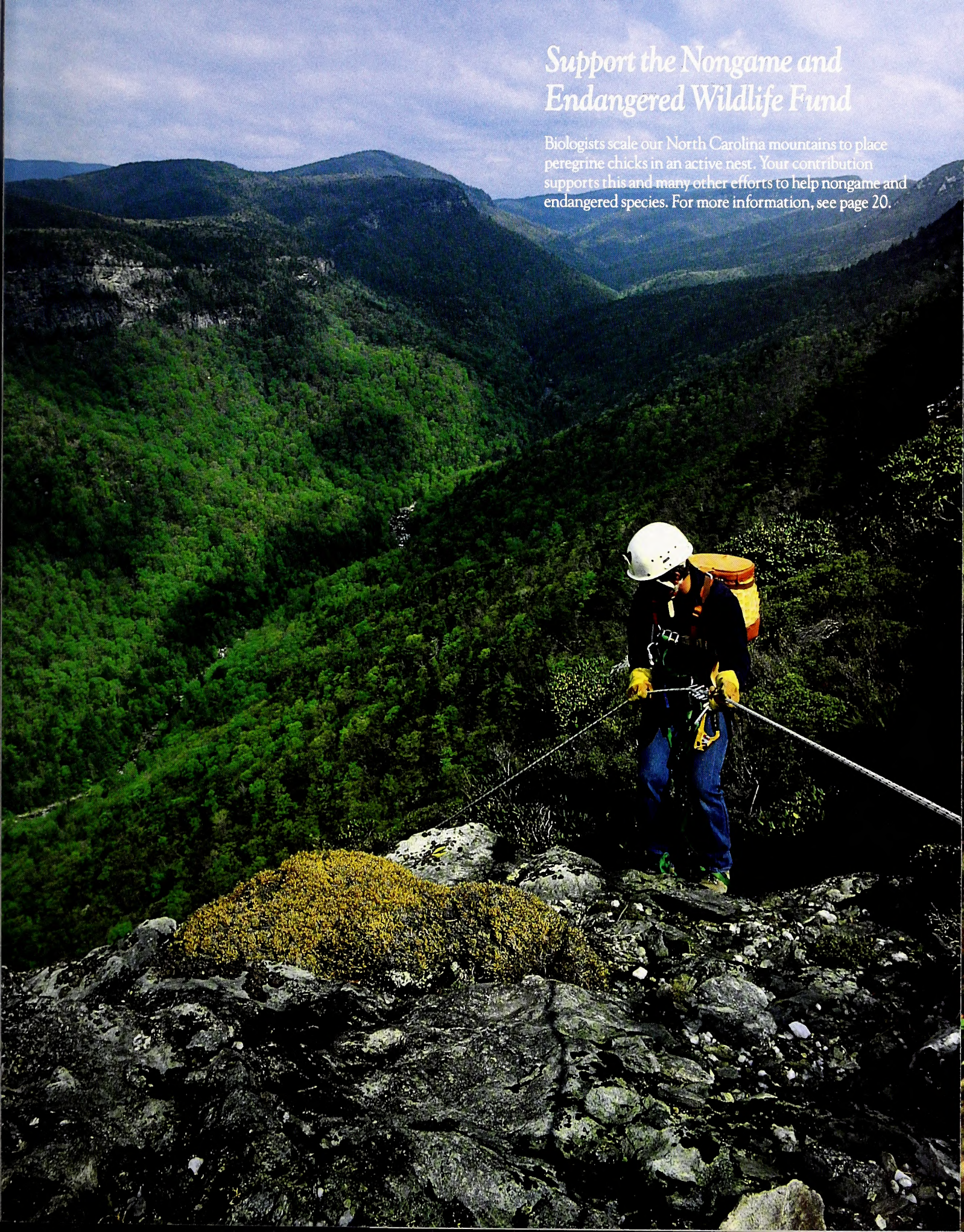

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Mister Two-Note

In spring, a bobwhite's fancy turns to raising a family, eating the rich bounty of insects and seeds and lingering in dust baths. It is also when we are most likely to hear this game bird's characteristic two-note call, one of the season's most recognizable signatures.

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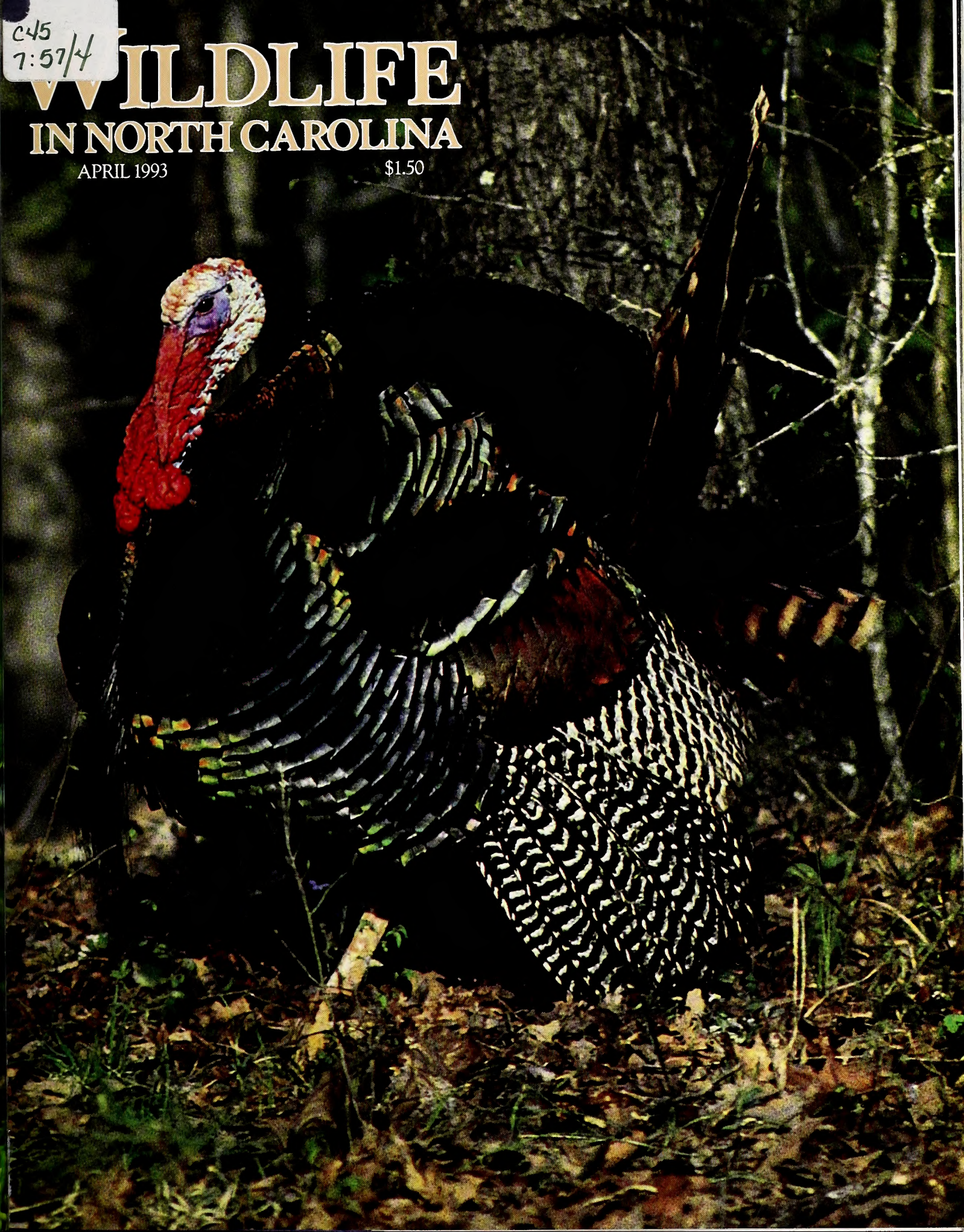
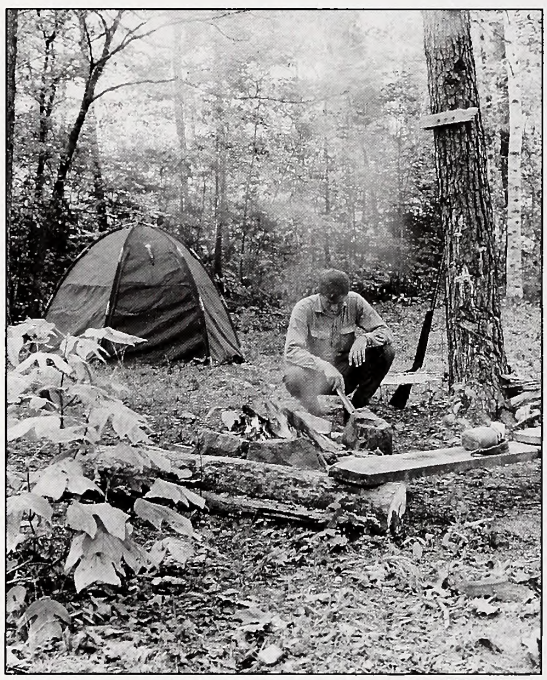


Hot Off the Fire

by Jim Dean

If you're old enough to remember when all television shows were black and white, you may also recall one of Red Skelton's most celebrated skits. He's cooking something and manages to put his hand on the griddle. Of course, it sticks instantly, and he's leaping around while it sizzles. Finally, he grabs a spatula and inches it under his seared paw just like it was a fried egg, then removes it to a nearby serving dish.

It was hilarious at the time, but not so funny to me in February when I stupidly tested a hot stovepipe with my fingertips. They stuck. I didn't need a spatula, but as I instinctively popped my burned digits into my mouth, I could see at a glance that they looked like a couple of wieners ready for mustard and rolls. There was no first-aid kit at the cabin and no water. Then, I remembered that I had a carton of Mom's blackeyed peas thawing in the trunk of the car, and was able to cool my fingers on the side of the carton. It seemed to help.



JOEL ARRINGTON

Later, I began to wonder what a medical burn specialist would think of my frozen pea remedy. By applying ice, had I taken a big risk or perhaps blundered into a suitable treatment? Or were my burns so minor that I'd simply been lucky? And what about other home remedies commonly used for minor burns—butter or juice from the leaves of an aloe plant? Can they help, or are they actually harmful?

Since all of us get burned occasionally, and especially those of us who spend time in the outdoors, it seemed worthwhile to check out the latest thinking among medical burn specialists and pass it along. Here's what I learned from the N.C. Jaycee Burn Center at UNC Hospital in Chapel Hill, and the U.S. Army Institute of Surgical Research at Ft. Sam Houston in Texas.

Let's start with butter or other greasy or oil-based applications. In layman's terms, when you apply butter to a burn, you're basically basting it. As one specialist put it, "Butter traps the heat and it keeps cooking, making the burn deeper and much worse." The juice from the leaves of an aloe plant or any similar skin-softening lotion may help much later when a burn is healing to relieve skin that is cracking and peeling, but it doesn't cool a fresh burn.

Ice is also a no-no. It may feel good in the short run, but it can create problems if you freeze the burn. Blood circulation is poor in burned skin, and poor circulation slows healing. Putting ice on a burn further restricts circulation, and it can also easily cause frostbite even in minor burns. On larger, more serious burns, applications of ice can increase the likelihood that the victim will go into shock.

So what should you do? First, say the experts, put out the fire in the burned skin as soon as possible with cool water, but don't immerse the burn any longer than it takes to stop the "cooking" effect—three to five minutes should be enough to return the skin to its normal temperature. The quicker you cool the burn, the better. It's still going to hurt, but that's better than further damaging the skin. Take care not to break any blisters, and if they break, keep them as dry and clean as possible. If you have clean gauze, a loose, dry dressing is a good idea. A piece of clean sheet will also work. If the burn is minor, you can leave it undressed. As for ointments, specialists generally agree that it's best to let a doctor recommend what to use and when to use it.

With more serious burns, it is important to keep the person warm to help prevent shock. A lot of body fluids rush to a burned area—thus the blistering—so you should elevate the burn above the level of the heart to help lessen swelling.

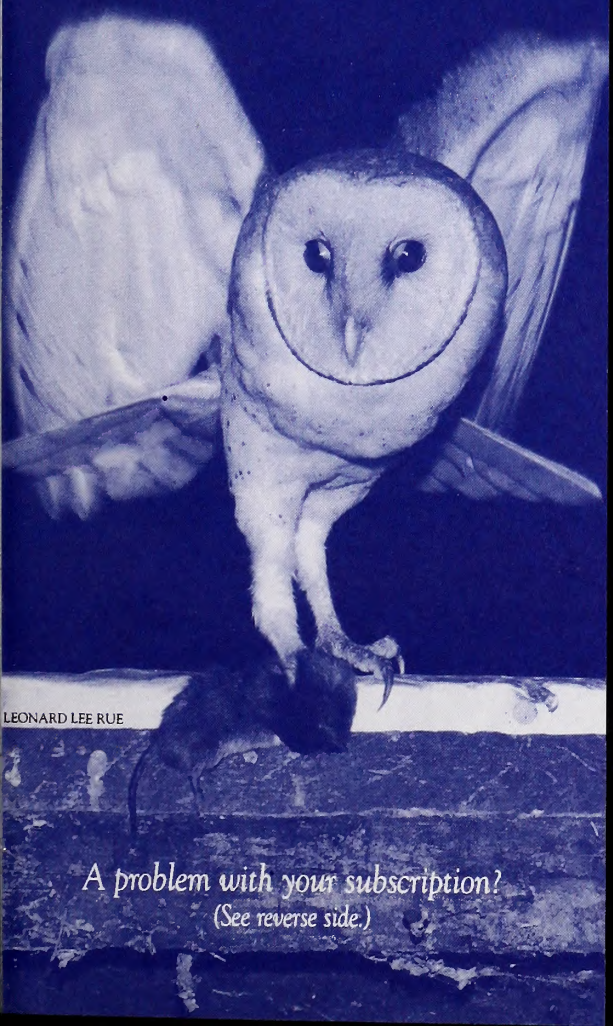
Because burns can get progressively worse for several days and lead to other serious side-effects, anything other than a minor burn should be treated by a doctor as quickly as possible. One common problem with burns is infection, all the more so for those who might be camping or away from normal sanitary conditions.

"Pack up and get to a burn center or hospital if you have any doubts whatever," one doctor told me. "If you wait to see what will happen, chances are it will get worse, not better. Any reasonably serious burn on an extremity—face, hands, feet, etc.—can lead to a permanent loss of function."

After a burn is beginning to heal, a doctor may recommend lotions to relieve the cracking and peeling. One thing that surprised me about my fried fingers is that they continue to be tender and sensitive to heat or cold even though they appear to be completely healed. Not unusual, I'm told, and more than enough to give me new respect for the old saying, "Once burned, twice shy."

Oh yes, about those peas. I don't recommend my thawing technique, but they were still good.

Predators Belong



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Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and also to the environment we share with them.

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Cover *A gobbler struts proudly in the spring woods to attract a mate. Photograph by Lloyd B. Hill.*

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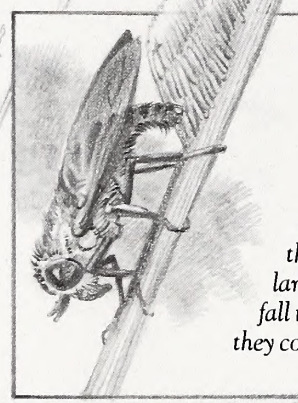
NATURE'S WAYS

Near a stream, *many creatures lay and tend their eggs. Wolf spiders can often be seen carrying a single, large egg from which numerous tiny spiders emerge.*

Like reptiles, *birds lay a hard-shelled egg that provides a complete life-support system for the growing embryo.*



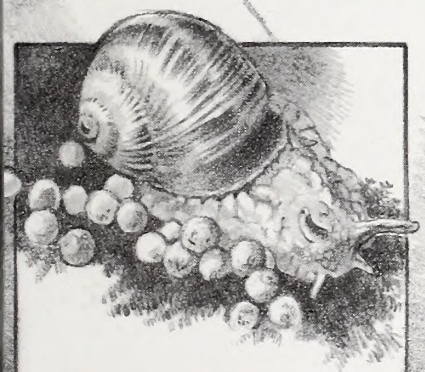
A horse fly *lays its eggs on a stalk above the stream. When the larval flies hatch, they fall into the stream where they continue to develop.*

The embrace *of male and female frogs stimulates the female to emit clouds of soft, jelly-like eggs into the water which the male fertilizes. The tadpoles leave their eggs before they finish developing.*

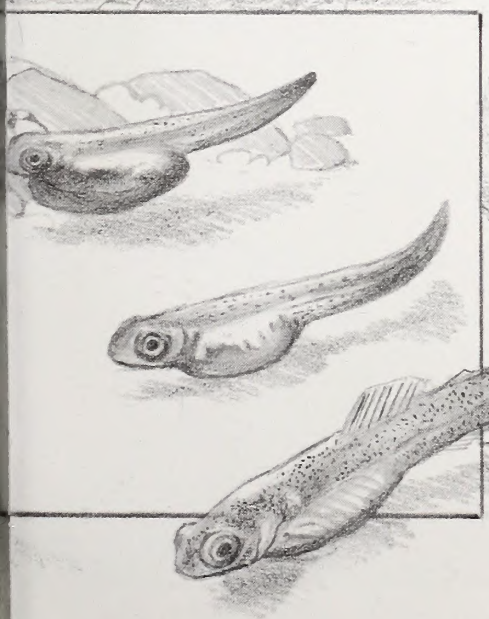
Raccoons, *like other mammals, are live-bearing as opposed to egg-laying animals. They like to eat eggs, however, including turtle eggs which they dig out of stream banks.*

In the stream, *trout eggs hatch and the young trout emerge with the yolk still attached to their bodies. The little fish will live off the yolk until they are able to find food for themselves.*

***Some snakes deliver** their young live. But most snakes lay soft, white, leathery eggs that the female guards.*



***Terrestrial snails** lay their eggs among the leafy detritus on the forest floor. Many aquatic snails lay their eggs within a protective jelly in the water.*



The Amazing Egg

written by Lawrence S. Earley/illustrated by David Williams

"I think if required on pain of death to name the most perfect thing in the universe, I should risk my fate on a bird's egg." Naturalist T. W. Higginson's claim is hardly exaggerated, especially this month. For what better sums up the symbolism of spring than a bird's egg? Of all spring's myriad forms, what better implies new life?

Against this fair claim, only one quibble can be lodged—for birds' eggs aren't the only ones found in nature.

Most eggs fall into two groups. One is produced by fish and amphibians that lay soft eggs coated with a jelly-like, protective substance that expands on contact with water. Because their yolk, or food supply, is generally small, the eggs hatch quickly and much of the baby animals' growth takes place outside the egg. Indeed, most fish and amphibians pass through several larval stages until they are completely developed.

This type of egg must be immersed in water to survive. Out of water, the eggs will dry out and the embryos die. Water also cushions the eggs against physical disturbance and it's the source of the oxygen that the growing embryo needs. Fish or frog embryos eliminate their waste directly into the water.

A very different kind of egg is the one pioneered by reptiles and followed by many other animals. Long ago, even before the age of dinosaurs, the reptiles developed an innovative egg that could be laid on land without jeopardizing the embryo. It represented a tremendous evolutionary advance, opening up terrestrial habitats for colonization by a multitude of creatures including birds and mammals.

Common to both kinds of eggs is a yolk that nourishes the growing animal. The chief difference is that these reptilian eggs (and those of later animals) have a relatively hard shell and a life-support package that provides everything a baby needs so that it can develop fully inside the shell. Yet a hard-shell egg poses certain challenges. How will the embryo avoid drying out inside the shell? How will it breathe and eliminate carbon dioxide? How will it eliminate its waste products?

Luckily, the egg contains a life-support system that can handle all of these needs. Enclosing the embryo is a watery sac called the *amnion* that keeps the growing baby wet and protects it from the shocks of movement. Another sac, called the *allantois*, receives the waste from the embryo's body. A membrane with blood vessels takes in oxygen and eliminates carbon dioxide through the pores of the shell, and still another membrane, called the *chorion*, encloses everything inside.

Because of this life-support system, the bird or the reptile doesn't have to pass through a larval stage. Upon hatching, it's already a miniature version of the adult, although in most cases the young animal is still quite vulnerable. The innovations spearheaded by the reptilian egg enabled many animals to exploit just about every terrestrial habitat on earth.

Humans and other mammals also develop from fertilized eggs, but unlike the embryo within the hard-shell egg, the human embryo is nourished by the mother's body. This arrangement means that unlike most egg-laying animals, mammals can be much more mobile, nurturing their embryonic young at the same time that they are looking for food.

Birds' eggs are admirable for sure, but so are trout eggs, frog eggs and those of all the other species that begin life within that narrow space.

Calling All Gobblers

To successfully hunt the king of the spring woods, you must obey the rules. Even those that change by the minute.

by Eddie Nickens ©1993

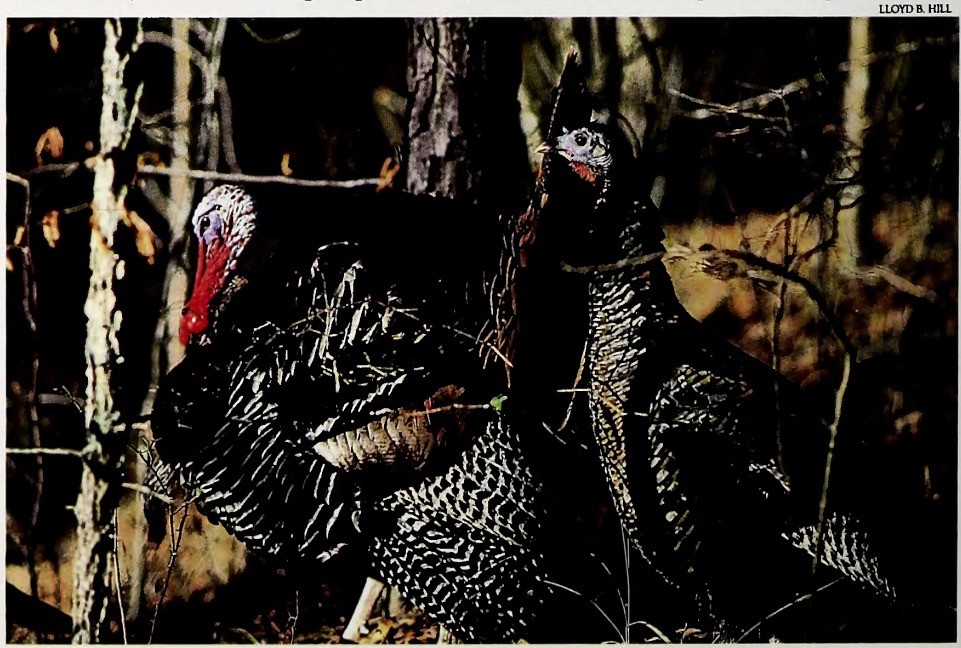
"My old man taught me to hunt turkeys," Mark Hanger whispers into a darkness softened by the glowing promise of a spring dawn. We are blowing hard after climbing the ridge, and each time he inhales, Hanger nearly holds his breath, eking out the air between clenched teeth. In the forced silence, Hanger listens for gobbles in the dark.

"Patience," Hanger says as he pulls a handkerchief from a pocket and mops the sweat from his brow. "My old man used to say that 'Patience kills turkeys.'"

Since before dawn we have been on the move, and a trickle of sweat drips down the hollow of my own backbone, giving me a cold, wet, spring chill that tells me winter is truly over. I have barely begun to learn of this turkey-patience from men like Hanger, a hunting and fishing booking agent and sometime turkey guide from Virginia. My experience with the wild turkey is limited to magazine pages, the pockmarks of birds in the mountain snow and the head of a single young bird bobbing about my gun bead. But I am learning, and my aching legs are paying the price.

"He's right," Hanger whispers, with finality, as if to tell me that I will soon find out, speaking even softer now as the sky begins to brighten. Behind wire-framed glasses his eyes peer into the wet woods of spring. "Patience. That's the most important thing."

LLOYD B. HILL



***The singular goal** of all mature wild turkeys in early spring is finding a mate, and gobblers (opposite page) strut almost incessantly while trying to impress a hen. This gobbler (near right) has already attracted a likely mate, but he's not taking any chances and continues to strut his stuff.*

I chew on this for a moment and decide it means that we're in for a long wait. Patience. No need to go running all over the countryside after a bird that's miles and ridges away. Might as well sit and wait 'em out. Not a bad way to spend a spring dawn.

Then a turkey gobbles from afar, a raspy wrinkle in the wet morning mist, like a creaking floorboard, a sound as faint as a leaf falling to the ground. It is as much felt as heard. You do not hear it as much as realize you have heard it. Hanger turns and grins, face flush with exertion.

"Didja hear that? Didja hear that?" Hanger snaps his head around to where the sound has come, from some small dale down the mountain and up the next one. He is strung as tight as piano wire.

"I think I know where that bird is," Hanger says. He turns and slaps me on the back. "He's just gotta be there. Are you ready?" But what about patience? I ask. Hanger grins a grin as wide as the new dawn.

"Woodsmanship!" he beams. "Knowing when to move, where to move. That's the most important thing!"

Ask a handful of turkey hunters what the most important element of the hunt is and you're likely to get a barrel of responses. "Know how to call," some will say. "Hunt where the birds are," others will tell you. A few experienced hunters will wonder aloud if there are any hard and fast dictums for the eastern wild turkey. "The first rule is, there are no rules," says Hanger. "And the second rule is, the turkey makes the rules."

After breaking more than a few rules myself I asked a few other noted turkey hunters what they considered the cardinal rules of turkey hunting. As suspected, I got a barrel full.

The best way to hunt wild turkey, says Hanger, is to first find the wild turkey. Not where he's been, by the scratches on the hardwood forest floor, or feathers on the ground, or scat in the fields—but where he is right now. That means pre-season scouting is a basic requirement, but it often isn't enough. The best, most promising way of hunting an old gobbler is to learn where he roosts and be waiting nearby before dawn, before daylight sends him flapping to the ground. The hunter might "shock" the bird into gobbling and revealing his presence the night before by using an owl or crow call. Or the hunter can challenge the bird with a gobble of one's own. If you can locate a specific roosting bird, you've automatically ruled out many of turkey hunting's wild cards.

Hunters looking for their bird during the last few days of the season should tread lightly and leave the call at home, lest they break one of another expert's cardinal rules.

"A week before the season, don't call," suggests Peter T. Bromley, associate professor of wildlife science at N.C. State University and author of the National Wild Turkey Federation's Code of Ethics. "Just listen. A lot of tyros hit the woods a few weeks before the season and start practicing their calls on the birds they hope to hunt. But what they're really doing is teaching the turkeys what a turkey call sounds like." Bromley says he may use an owl hooter to try and locate a roosting turkey, but he never yelps during those last few days of scouting.

Once in the field, Dixon Herman, a longtime turkey hunter and expert caller, remembers what legendary turkey biologist and hunter Wayne Bailey once said. "Bailey said that hunting turkey is as simple as putting yourself between the bird and where he wants to be," says Herman. "Chances are, mediocre calling won't make him change his mind, but even the best calling in the world won't get a gobbler to go to where he doesn't want to be. That's why setting up is maybe 50 percent of turkey hunting."

"Setting up" means choosing exactly where you plan to ambush your bird. "If there is any obstacle," says Herman, "any obstacle at all between you and the bird, forget it. You have to be in a place where the path of least resistance will bring that bird within 40 yards of your gun barrel." Creeks, fences, thickets, canebrakes—they're like walls to a gobbler. And once you're in position where the gobbler can't see, hear, smell, taste or use some form of ornithological ESP to detect your presence, freeze.

"There's an established list of turkey hunting rules," Herman says. "Rule number one is, 'Be patient.' Rules 2 through 10 are, 'Don't move. Don't move. Don't move. . . .'" In the 10 commandments of turkey hunting, says Herman, "Thou shalt not fidget" has to be on the list.

"It's unreal what a turkey can see," he says. On several occasions, Herman says, turkeys have picked him out of the woods by seeing his chest rise and fall when breathing, or detected breath-smoke on a chilly spring morning. Hunters with birds coming in simply cannot make any movement. Hanger sometimes closes his eyes to keep the birds from seeing him blink and only moves the gun when the gobbler's head is obscured from vision.

Such acute senses make complete camou-

EDDIE NICKENS

***Perhaps no form of hunting** requires more exacting camouflage than turkey hunting, and this hunter even wears a head net to hide his face. Hunters with a knowledge of the habits of turkeys and carefully honed skills at calling are the most successful.*

LLOYD B. HILL

flage a must for hunters. A stripe of uncovered wrist or patch of bright boot sock can flag off a gobbler before the hunter is even aware that he's been spotted. Once camouflaged and in position, the hunter should draw a knee up to support the shotgun and cradle the stock against the shoulder. After 10 minutes that tiny knot in the tree trunk will turn into an icepick, the top of your boot will dig into your calf, and your shotgun's ejection port will carve grooves into your kneecap. But if you remain motionless and don't break too many other rules, there may be a gobbler in your gun sights shortly. Time, then, for another rule.

Pulling the trigger on a turkey, says Bromley, is no simple matter. "You must forget that you are holding a shotgun, and imagine you are shooting a rifle," Bromley says. It's an important distinction.

"Another of my cardinal rules—and the more I think about it the more I seem to have—is to know your gun and know your load. There's a difference between point of aim and point of impact, and when a gobbler walks in front of your bead, you'd better know what that difference is for your gun and for your load."

To aid in aiming, Bromley often places a small triangle of white tape on the back of the gun's receiver in line with the barrel bead. The tape serves as a rear sight and reminder to aim the shotgun, not just point it. Then he aims not at the head of the bird—where half the shot load sails over the target—but a bit further down the neck, where the wattles begin. That's where he knows he can put 7 to 10 killing pellets at 40 yards and less. Those are my rules, says Bromley. But the turkeys have a few of their own. The problem is, nobody knows them but the birds.

We have set up on our bird, who has been silent since we first heard him gobble. I quietly break off a troublesome branch to my right, and check to make sure the ends of my pants don't rise above the tops of my boots. I am ready. Hanger pulls out a slate call, and begins to play.

He uses the "sweet" calls—a crisp, clean yelp—the coed candor of the young hen. This bird drives a convertible, the call seems to say. Some callers deliver with a throaty, raspy bite, a low-pitched putt and purr like a mixture of unoiled door hinge and unabashed Lana Turner. Their girl is no teenager and she drives a Porsche bought with an older man's money.

***No woodland creature** is more wary than a wild turkey, and it is not all that unusual for a hunter to complete the short spring season without ever seeing one.*

Hanger opts for the sweet calls, the tease calls, and he uses them only intermittently, making certain not to call too often. He pulls a plaintive yelp from the round disk of slate he holds on his knee, drawing a corncob striker across the slate surface in a series of small starts and stops. "... pert-pert-pert-pa-CAW-CAW-CAW-CAW-CAW-caw-caw." He remains perfectly still between calls, letting the woods soak up the sounds before starting over. He knows that everybody's been hollering at these birds, so he figures he'll give the gobblers something to think about.

We remain motionless for 30 minutes or more. Nothing. Nada. Only the sounds of spring ferns unfurling. Then, across our right shoulder, faint as a fingerprint in the wind, a gobble. It comes from down the hill we climbed before, down the road we humped up in black dark, across the valley and up a distant dale.

"Didja hear that?" Hanger comes alive. "Didja hear that?" His eyes freeze on the direction of the gobble. By now I know what is happening inside the turkey hunter's head. His mental radar is scanning this new piece of information, this glowing blip on an invisible screen. We have heard nothing for 30 minutes or more. His next words are as inevitable as the grin on his face.

"I think I know where that bird is. Let's go."

After all, he says, topography is the most important thing. Topography, you understand? ⛶

EDDIE NICKENS

The author, Eddie Nickens, *displays his handsome trophy. Intensive restoration of the wild turkey through live-trapping and restocking combined with a spring, gobblers-only season has brought turkey populations in North Carolina from about 2,000 to an estimated 35,000 birds.*

MELISSA McGAW

HATTERAS FISHERMAN

Ernal Foster pioneered offshore sportfishing on Hatteras in the late 1930s and '40s. He remembers the hurricanes and life in the isolated, dirt-street villages before the Oregon Inlet bridge brought so many changes.

interview by Lawrence S. Earley

It's not hard to find Ernal Foster. Most warm days, he's working in the little wooden office by the dock in Hatteras Village where his boats are tied. Below his cap his face reveals the deep creases of a life spent on boats. A shy grin comes and goes depending on the mood he's in. He'll talk as easily on the politics of water on Hatteras Island (no grin at all) as on the big fish he's caught and the fishermen he's known.

At 83, Cap'n Foster is one of Hatteras Village's most famous citizens. In the quiet years before the Herbert C. Bonner bridge was constructed, when Hatteras was still a remote commercial fishing village accessible only by ferry, he pioneered the offshore charter boat business, taking sportsmen out to the Gulf Stream to fish. At first he fished mostly over wrecks for mackerel, dolphin and amberjack, then in the years after World War II, it was for bigger game like sailfish and marlin. Those were the years when outdoor columns everywhere showed photographs of beaming anglers and huge billfish, with captions citing Cap'n Foster of the Albatross fleet.

Foster's first boat, Albatross, *and the two subsequent boats in the Albatross fleet, are pretty boats to behold, built low on traditional Hatteras lines—sharp at the bow and rounded at the stern. Before a Harker's Island boatmaker would build the* Albatross *in 1937, he had to be convinced that its deep Vee-bottom—the famous "dead-rise" hull—wasn't dangerous. Harker's Island boats, though remarkably seaworthy themselves and capable offshore, were built with flatter bottoms for stability when commercial fishing in the quieter waters of the sounds.*

Wildlife in North Carolina visited Cap'n Foster last August to talk to him about his life on Hatteras Island.

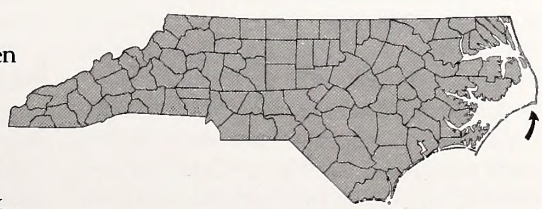
AYCOCK BROWN

***Ernal Foster sits on the deck** of the* Albatross *in Hatteras Village. The Albatross fleet consists of three boats, including the* Albatross II *(above) constructed in 1948. With his boats, Cap'n Foster pioneered sportfishing off Hatteras Island.*

I was born in 1910 and raised right here on the spot where this house is. I started going on boats when I was a boy working with my father. He always said, "If you don't respect the ocean, stay away from it." I've always been pretty careful. So far, I've never had a mishap. I've fished for over 50 years in the Gulf Stream, and I've never had to be towed home; I've never got lost.

It's all right down here on Hatteras when it's pretty. But when it gets bad . . . people who have never been here during a storm don't know what it's all about.

In 1933, I spent a hurricane on the roof of a house. I was fishing days and staying at the Green Island Hunt Club nights, had my



Hatteras Island

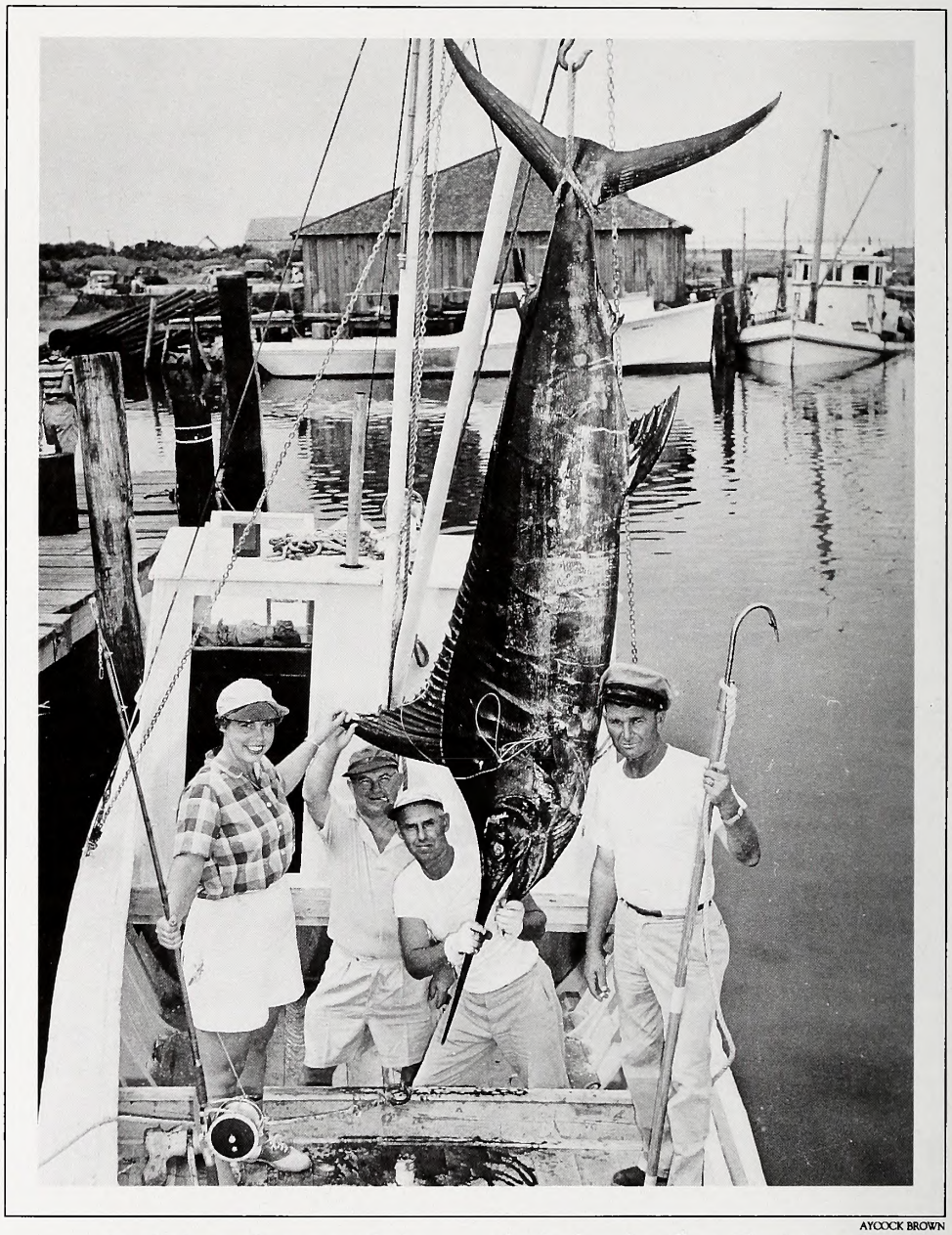
brother with me—he was 14 years old. My father said, "Better take the boat home, we're going to have a storm." You could see the ocean out over the beach house; it was rough. I said, "If it's bad, I'll come home tomorrow." The next morning it was so bad I couldn't come home.

This was the hurricane of 1933. There's only been one worse than that one since I was living around here. We spent the night in the clubhouse. The ocean came across the beach, and our boat broke loose and went adrift into the sound and ended up out in the marsh. That night the sea tide came in and it got waist-deep in the clubhouse. A barge come in and knocked the side out of the house. There were seven of us there and the dining room table was floating around with our dog on it.

I knew we had to do something, so I went into the bathroom and took a piece of two-by-four and knocked out a window. We crawled through the windows and got up on the roof and that's where we spent the night. You could hear them breakers coming across that beach and smashing themselves there. Next morning we found that a sea tide had come around, undermined the house and the house had sunk so far that the eves were even with the ground. Eighteen feet of water come right through the end of the big building. Eighteen feet of water. If the house had gone to pieces we would have all drowned.

That was on Friday night. My boat had gone on the beach and if it hadn't been full of water, it'd gone out to sea. It stopped on a hill 200 yards from the ocean. Saturday or Sunday we got ahold of one of the hunting skiffs they used to carry hunters out to the blind with decoys. It had a one-cylinder engine. About 12 o'clock we got it running and got back to Hatteras about 3 o'clock in the afternoon. They thought we was all dead. All the fish houses out in the Sound, all of them were just stobs sticking up. Everything was destroyed.

When I was growing up, there were about 700 to 800 people living in Hatteras Village. There were a lot of large families. There were seven children in my family and some families had 10 and 12 children. We didn't have no running water. We had a cistern that was built about 1922, 1924. We had one cart track through the village. It was dark through them woods. The trees overhung the road. When we dated girls up in Buxton, we had to ride our horses up there, about 10 miles away. You'd sneak out, go up to see your girl, and then on the way back, you'd put your line over your saddle and just forget about the horse. He'd bring you home. Of course, if your horse got loose you'd have to walk home.



AYCOCK BROWN

***This hefty marlin** was caught by Mrs. Ross Walker, the first woman to catch a marlin in the mid-Atlantic region. Left to right, Mrs. Walker, Mr. Ross Walker, Cap'n Foster and an unidentified mate.*

For a long time we got off this land by boat. We didn't have cars here. We had boats that went from here to Elizabeth City. There were fish houses out in the sound, no harbors. The fishing boats tied up to the fish house and the freight boats would come in and they'd load the fish onto freight boats and take the supplies back to the village. That's how all our groceries come.

My father was a commercial fisherman when I was coming up. In the spring of the year, the biggest fishery here was shad fishing. In January the men would get their stakes in and they'd wait until after the 15th of February to put in their nets so that the ice wouldn't cut them. They'd ice the shad down and put them in boxes, take them to Elizabeth City and they'd go by train from there to New York.

Shad fishing was a living in those days. It used to pay their grocery bills once a year. When they got through shad fishing in April, they'd go to the store and settle up for their expenses. They'd pay their grocery bill.

That was a big fishery back then. As the

years come along, it gradually played out.

Sometimes they'd trade fish for corn. Nights they'd go out on the reef and fish jumping mullet with nets. Then they'd salt 'em down and take 'em across the sound in sailboats and trade 'em for corn with the farmers. We had no storage in those days. We couldn't keep meats. That's why everyone had a garden and two pigs. They'd fatten the pigs up in the fall and then after the first cold spell, knock 'em in the head. You'd salt the meat so you could have it in the winter time. They'd take the fat and make soap out of it.

There wasn't much wasted then. You couldn't run to the store and buy everything like you do now.

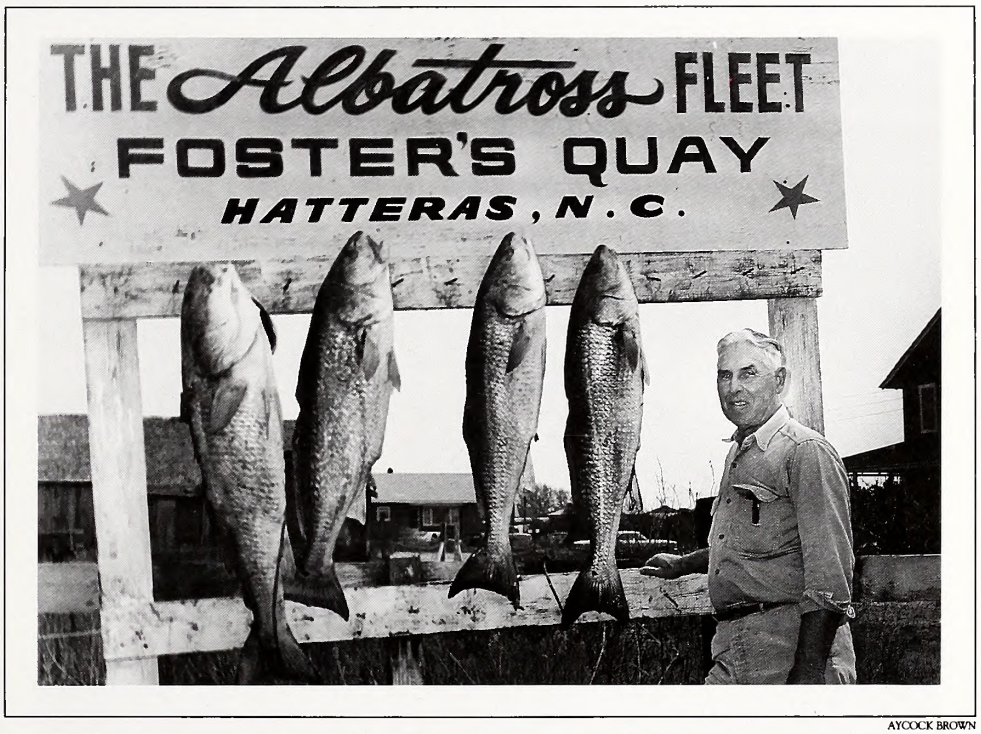
The beach on Hatteras used to be flat, but in the mid-thirties the Roosevelt Administration put in what they called the CCC camp and they built up the dunes. They sent all these young boys to camp at Buxton, out on the beach. They come from different places. The man that was the head of them was named Byrum. They had been sent here to build dunes but he didn't know how to do it.

One day he went out on the beach and set down. While he was there, he noticed two or three sprigs of grass that the wind was blowing. The grass was swirling around them and the sand was starting to build up on the back of it. That's where he got the idea to put sand fences on this beach. They tagged bushes on boards, brought them in on barges and put them on the beach so they would trap the sand. And when it would build up to the top of them, he'd put another row on top of that. And they planted sea oats and they spread.

A lot of people don't know that without those CCC boys, this beach would be flat all the way up the island. It's hard to believe now.

The men on this island didn't want that beach built up. My father and all the old people were against it. They had a good reason. See, they never worried about floods. When we got a northwester, it would flood this island but it'd just keep going into the ocean and that would be it. When the tide rolled in the front door you'd go upstairs. But now with the beach, if we have a big storm from the northwest and the wind blows hard, the water backs up and floods most every house off its block. That's what happened during the hurricane of 1944.

I got started fishing when I was a boy about 15 or 16 years old. I used to take my boat down to Morehead before they had a bridge between Morehead, Beaufort and Atlantic Beach. On Sundays, we'd carry people over to Atlantic Beach. They come in on the train about 7 o'clock in the morning, come down to the dock and we'd run parties down there. The only thing at Atlantic Beach then was a pavilion. There was no place to stay, so they'd go bathing and come back in the evening.



AYCOCK BROWN

***Cap'n Foster took parties** out to the Gulf Stream to fish for marlin and other big gamefish, but channel bass or puppy drum provided good fishing for anglers in shallower waters.*

When I was 18 I told my father I wasn't going to fish all my life, so I quit. I left home. I went to Long Island, New York.

I joined the Coast Guard for two years. Went up there in 1928 and quit in 1930. After that I worked in a sheet metal shop 'till February 1933. I got laid off. The boss wanted me to hang around for a couple of weeks, but I said I was going home.

So I come home. There wasn't much to do. I pushed a clam rake for 15 cents a hundred. I painted houses for 15 cents an hour. That's how I got my first boat in 1937. It didn't come easy, but I still got it. That was the *Albatross*. Later there was the *Albatross II* and the *Albatross III*. All of them were made of juniper and the same man made all three of them.

For the first one, the cypress framing came from a mill in Washington, N.C. It was the prettiest lumber. The juniper planking come from Buffalo City out by East Lake near the Alligator River. There was a big sawmill in there and a lot of juniper. They cleaned it out in World War II. Destroyed it. The government used it for building boats and that was a shame. They cut it all down and never did replenish it.

When I took my lumber down to Core Sound, two boat builders at Harkers Island wouldn't build my boat and two in Morehead wouldn't build it, either. The plans called for more dead rise in the hull—more of a Vee-bottom—than they had ever seen in a boat. They didn't want to build it the way I wanted it to be built. They wanted to build it their way, which was with more of a flat bottom. I finally went to a guy in Marshallberg, at the Willis Boat Works, and he didn't want to build it at first. I said, "Well, it's my lumber. If you ruin it, it's my tough luck, not yours. I won't blame you for it. But this is the way I want it built." He said, "If this is the way you want it, I'll build it for you."

The planking—the juniper—cost me 4½ cents a foot and the framing cost me 3½ cents a foot. It was built down there for $650, furnishing everything. The lumber cost $100. Of course a dollar then was a big piece of money. I built the *Albatross II* in 1948. It had the same specifications, but it was built a little bigger. She had pine in her framing. I built the third in 1952. She had cypress framing.

Well, when I got my first boat I decided I'd take some parties out fishing. People would come in fishing, they'd want to surf cast. First party I carried was from Virginia Beach. I had four trips the first summer. Twenty five dollars a trip. The next summer I had a few more and it kept building and building. My custom-

BRANTLEY BROWN

***Hopes of catching** world-record marlin like this lured sportsfishermen to Hatteras and other coastal points after World War II. When Ernal Foster began taking parties out, he was practically alone. Today, party boats from Oregon Inlet and Hatteras Island are common.*

ers came all kinds of ways. They had a ferry across Oregon Inlet, had a bus right in Manteo, a round trip a day. That was before the Bonner bridge was built. A lot of my customers came to Englehard and I'd pick 'em up there. I had someone come down from Pennsylvania. He'd come to Baltimore and then go down to Norfolk on the old Bay line and drive on down.

I had just got going good when the war come on and I was drafted in January of 1942.

I was the first one to do anything out of Hatteras like this. One or two guys would take people out once in a while, but no one wanted to mess with it. They said I was crazy to mess with it. For me, it were nothing to it. I made something out of it. I turned Hatteras into a sportfishing village. Look at it now and see what's on the waterfront. Three marinas are here now. So a lot come from what I started in the thirties.

What I was doing spread around mostly by word-of-mouth. But I also got connected with a bunch of outdoor writers. They used to come down here and I'd take them out fishing. That's how it all started. One of my good friends worked for the Pittsburgh press. I'd send them information about people in their area who'd been fishing with me and they'd put it in their outdoor columns. If I put an ad in the paper, people might not read it. But outdoor writers, people are going to read them to see what they're catching.

But what helped get Dare County started as an outdoor center was Aycock Brown. He started the tourist bureau in Dare County. He was a photographer and he covered the waterfront. I knew Aycock before he ever come to Dare County.

When I first started carrying parties back in the thirties, people weren't catching a lot of billfish like marlin. We didn't have nothing to catch them with. I'd fish Diamond Shoals with my parties. There's a bunch of wrecks there, see, and they were full of amberjacks. I'd fish with my father there when I was a boy. I'd go out and fish the wrecks and then go on out to the lightship. There'd be a lot of big dolphin out there. And you'd get wahoos out in the Gulf Stream. A marlin? A marlin would come in, grab the bait and go off jumping. You'd just watch him go. Take all your line off your reel and keep on going.

Only three marlin that I know of were caught before I started. They were caught by people in yachts who had big tackle. The people I was fishing with, all they had was small reels and they weren't built for marlin. The first blue marlin I ever saw caught was caught by a man from Long Island who caught it off Hatteras. This was in the late thirties. He's the one who gave me my first outriggers and helped me get started. Showed me how to rig my baits, had his own guide with him, put my outriggers on my boat. Outriggers are the poles. You spread them out, and put a clip onto 'em, a clothespin. Then, clip the line from your rod to the clothespin and run it up the pole. Your bait then skips on the water behind the boat.

The marlin has a habit of coming in and killing his bait before he picks it up. Now sometimes, he don't do that. Sometimes they come in and crash the bait. But a lot of times they come in and hit it with their bill—see, that's their way of killin' the bait—then they

turn around and pick it up.

The big reels started coming in after World War II. I had a 9/0 I bought in Norfolk. It cost me $27. After World War II, I caught my first blue marlin with it and I had to catch it myself.

I had a party, a bunch of retired men from New York. We were fishing for sailfish, so I carried my 9/0 with me. The day before, I pulled my bait away from a marlin. It was on a smaller reel so I couldn't have caught him anyway.

The next day I carried my 9/0 out and put it out and instead of getting a sailfish, a marlin come in and hooked hisself. And I tried to get someone to take it, but no one would. They made me catch it! Bunch of old retired men. It took me 2 hours and 45 minutes. I didn't have no harness or nothing, and that's hard, catching a fish like that with no harness. Now we have a harness, a footrest and a chair, like a barber's chair. So your back will pump the fish. You don't use your arms; all you do is pump the slack.

After I caught that marlin, Aycock Brown made a picture and people started coming to Hatteras to catch billfish. There were lots of pictures made on my dock. We started hanging the fish up on racks and Aycock would make sure there were always a couple of teenage girls in their bathing suits.

Like everything, fish come and go in cycles. My father would say, "They got fins and tails." They come and go.

Two years ago, in the fall, there were no bluefish here. And it used to be there'd be a small run every summer, and there ain't been one this summer. But they started to show up now. The year before last, my son was home for Thanksgiving. After we had lunch, about 3 o'clock, we drove down to the point of the beach, and the bluefish were going out the inlet, the most I've ever seen. They had walled up these little menhaden and were laying on Hatteras so tight—the bluefish were surrounding them, see—that a lot of them were laying on top dying 'cause they couldn't get back in the water. The fishermen were throwing the lines in the water, hooking 'em and throwing 'em on the beach. One man had a pile of about 25 on the beach, 2- or 3-pound bluefish. He said, "Take all you want, I don't want them." I said, "Well, why are you killing 'em if you don't want them?"

That was Thanksgiving Day, two years this Thanksgiving. And where they come from, nobody knows. So that's the way it is. There are none, and then all of a sudden they show up. I been here all my life, and these things comes and goes.

I believe we've overfished some species. We've overdone it offshore on dolphin. We've been killing too many. What I don't like is that everybody sells 'em. Of course, that's a touchy issue with some of them around here. Even the commercial fishermen, they go out there and bottom fish. They collect everything they can catch. And these private boats with outboards can catch a bunch of 20- or 30-pound dolphin and sell 'em to the fish market. I'm against it. I told one fisherman, I thought there ought to be a $10,000 fine to sell one or buy one. You go to a restaurant, you can get these fish now. Used to be they didn't put 'em in a restaurant. Now the restaurants are selling dolphin.

When I'm out there catching dolphin, I'd say to my customers they're too pretty to kill. I said, "If you want 'em, take 'em home. If you don't want 'em, let's put them back." I don't believe in killing something you're not going to use. That's my idea. I've seen private boats bringing two and three marlin and throwing 'em on the dock. They'd leave 'em on the dock or take 'em out and let the crabs eat them. Throw 'em out in the sound. They'd be floating around in the sound. That's what's happened.

The only thing that saved this island was the U.S. Park Service. I spent five years on Long Island where the beaches were all owned by millionaires. Everything was blocked off; you couldn't go to the ocean. And after I returned to Hatteras, that's what I saw happening here. If they started developing this beach, you wouldn't get to the ocean. If it wasn't for the Park Service and the Cape Hatteras National Seashore, you'd never get to the ocean no more because it would all be private.

Of course there aren't many people who agree with me. The real estate people weren't happy. They wanted all this land so they could sell it.

Like I been telling you, you can destroy anything if you don't look out. ☐

MELISSA McGAW

***Cap'n Foster's memorabilia** include some of the earliest big reels made for catching billfish like marlin. When Foster began billfishing, the big gamefish simply overpowered the smaller tackle available.*

"Carolina Profiles" is a periodic feature in Wildlife in North Carolina. *In these interviews, men and women reflect on their outdoor experiences and on what the land and its resources mean to them.*

Swamp Dancers

Cattails can provide many of life's necessities, just as they once did for native Americans. But beware if you're in the mood to boogie.

by Doug Elliott ©1993

"Supermarket of the swamp." That's what Euell Gibbons, the dean of American wild-food foragers, called the common cattail. It is said that you could never starve living next to a cattail marsh. I think this is close to the truth. You can hardly find a more versatile wild plant.

Young, tender cattail shoots, when they first poke out of the cool water in early spring, have been called "Cossack asparagus" because cattails are a traditional spring food among country folk in Russia. *Clarke's Travels in Russia* tells of people devouring cattail shoots raw "with a degree of avidity as though it had been a religious observance. It was to be seen in all the streets and in every house. They peel off the outer rind and find a tender white part of the stem which, for about its length of 18 inches, affords a crisp, cooling and very pleasant article of food."

If you want to try this spring delicacy, head for your favorite swamp when the weather warms. If you look around the edges of the old, winter-beaten cattail leaves and stalks, you'll find the new green shoots poking out of the water. Just wade out and start pulling. Each shoot usually breaks off at the base where it joins the rootstock. The base of each shoot has a tender core a few inches long. Shoots are mild-flavored and can be eaten raw right out of the swamp (Be sure of the water quality), or they can be stir fried, steamed, added to soups or used in salads.

DOUG ELLIOTT

DOUG ELLIOTT

***Author Doug Elliott** regularly teaches courses in natural history and folklore. Here, members of one of his classes wear handsome hats woven from cattail rushes. In addition to their uses in mountain crafts, many parts of the cattail are also edible.*

By late spring, or early summer, the part that later becomes the "cattail" is forming. It is composed of two cigar-shaped spikes, one above the other. The lower one is the seed-bearing, pistillate, or female flower that later turns into the brown cattail. The upper one is the pollen-bearing, staminate, or male flower. The dry stem that protrudes from the top of the brown cattail later in the season is all that remains of this male flower.

Just before they come into bloom, both parts are green and wrapped in a sheath or husk. At this stage, the top, staminate spikes can be picked and steamed for 10 to 20 minutes and served with salt and butter like miniature corn-on-the-cob. I call them "cat-on-the-cob," and they are one of my favorite wild foods with a unique flavor that reminds me of corn. Some folks say they taste like artichoke hearts. Even if you don't like artichokes, or corn, there still is a good chance you will like cattail tops.

A little later in the summer the spikes will shed their wraps and the nuptial delights begin. The green staminate spike swells and begins a lusty shedding of powdery yellow pollen that spills down over the pistillate flower spike below. With the help of a breeze, this pollen is dispersed across the marsh to ensure a healthy cross-pollination of the rest of the cattail population.

You can also share in the pollination celebration if you are willing to wade out among the blossoms. By inverting and shaking each swollen, yellow spike into a bag, a substantial amount of pollen can be collected in very little time. This pollen is as smooth and fine as talcum powder. It can be mixed with equal parts of flour and made into wholesome yellow-tinted breads, pancakes, biscuits or pastries. It can also be used like saffron to color rice dishes.

The high-priced "bee pollen" that is sold in health food stores as a nutritional supplement is simply pollen gathered by bees from various flowers (including, sometimes, cattails). What you are collecting from cattails is essentially the same, except that you do the gathering. You might call it "people pollen."

While this celebration of pollination is going on in the upper levels of the marsh, down below in the muck and mire, the cattails' rootstocks are also rapidly growing, producing tender, white tips. These tips, if you can get them before they shoot upwards into the light, are good eating. Just peel them and munch them fresh out of the marsh. You can also use them in a salad, or cook them.

The long sections of horizontal rootstocks between the leaf clumps have a starchy core that can be used as flour. Even today, cattail flour is still an important food for some Native American groups. One method of extracting the flour is to dry the roots, grind them up, and sift them to separate the flour from the fibrous cortex. Euell Gibbons, well-known advocate of wild foods, developed another method I use that entails washing and peeling the fresh roots. The cores are then put into a bowl of water and crushed by hand until the fibers are all separated. The sediment is allowed to settle for about half an hour, then the water is carefully poured off, leaving the starchy residue on the bottom. More water can be added and subsequently poured off after further settling to more fully refine the product. After the last settling, pour off as much of the liquid as possible, add a little regular flour to thicken it and use it to make your favorite breadstuffs. As if all these edible parts weren't enough, at the junction of the stalk and the rhizome is a thickened area of starch that, after peeling, can be cooked like a potato and added to stews or soups.

Cattail leaves have long been used as weaving material, not only for mats, baskets and hats but also to make rush chair seats. If you want to weave with cattails you need to gather the leaves when they are full-grown but still green. The leaves must first be dried under cover. You have to moisten them before you weave with them.

By now, you're probably wondering if there's any end to what you can do with cattails. Hang on, I'm just getting started. For example, some folks call cattails "punks" because the dried brown heads slowly smolder when ignited, and the pleasant smelling smoke will repel mosquitoes.

If you want to use cattail heads in dried-flower arrangements, be sure to gather them early in the summer or one day you might come home to find that your tidy, artistic arrangement has "exploded" and filled your house with bushels of fluff from the downy seed hairs. These hairs are light and buoyant, a quality that serves to carry the seeds long distances, even to isolated and newly formed wet areas. Because of this, cattails can be found in many parts of the world, from the tropics to the far North.

I have a down vest that looks like the expensive goose down vests that have been so popular among outdoor people in recent years, except mine's homemade and it's stuffed, not with goose feathers, but with down from about 40 ripe cattail heads. My vest is very warm and though it's not as light as one made with goose down, it has one special feature that feathers don't have. It floats, and doubles as a life preserver. This is quite a comfort on winter boat-

ing adventures or when I'm skating on thin North Carolina ice.

I don't know if I have established that you wouldn't starve next to a cattail patch, but with all the processes I've described, clearly you would not suffer from boredom while you were wasting away.

While we humans might barely subsist on cattails, these ubiquitous marsh plants provide a bounty of food and shelter for wildlife. Cattails are the lifeblood of many marsh-dwelling critters. It is here in the shallow water among the crowded stalks and tangled roots that the food chain starts. This is the nursery ground for the insects and the tiny fish that feed the larger fish, the amphibians and reptiles, the birds and ultimately the rest of us.

Cattail roots and shoots are also the principle food of muskrats. It is often said that if you want to find muskrats, just look for cattails. Muskrats can live off the starchy shoots and rootstocks of cattails, and they construct their lodges partially from the leaves and stalks. They dig tunnels and canals through the thick mats of roots, creating pools of open water in the dense growth that protect small fish, frogs, turtles and other creatures. Marsh wrens, rails, bitterns, red-winged blackbirds and ducks build nests in the depths of the cattail marshes while herons, raccoons, possums, otters, mink and other animals prowl among the cattails in search of prey.

Native Americans have long used the cattail not only for food but also to weave mats and baskets and thatch wickiups, wigwams and other shelters.

According to an old Indian story, Coyote—that foolish trickster—was out walking one evening. He was following a trail along a ridge beside a low-lying area when he suddenly heard sounds coming from that low spot. It sounded like music. It was almost dark and he couldn't see very well, but he could hear the music. Yes, there was no mistaking; that was the sound of dance rattles. There was a dance going on.

There was nothing Coyote liked better than a dance. He knew he was the best dancer and he loved to get right in the middle of the dance circle and show off, so he hustled right down that hill and pushed his way into the middle of the crowd. He could hear the rhythmic rustling of the dance rattles. Swish, swish, swish, swish. There were so many of them and they were making beautiful music. Swish, swish, swish, swish. Everybody was swaying back and forth. Swish, swish, swish, swish. Coyote started doing his fanciest steps and saying things like, "You think you know how to dance, I'll show you how I dance!" He started really strutting his stuff, but nobody seemed to notice. They just crowded around him and kept swaying back and forth. And the dance rattles kept their steady rhythm. Swish, swish, swish, swish.

Coyote was getting tired, but he didn't want to be the first to quit. Finally he said, "You know sometimes when we dance, we rest!" But nobody stopped to rest, and when the dawn came, he realized that he had been dancing with swamp dancers.

That's the Native American name for cattails. And as Coyote looked around, bleary-eyed and exhausted, the swamp dancers were still swaying back and forth. They're still out there and they are still dancing. ☐

KEN TAYLOR

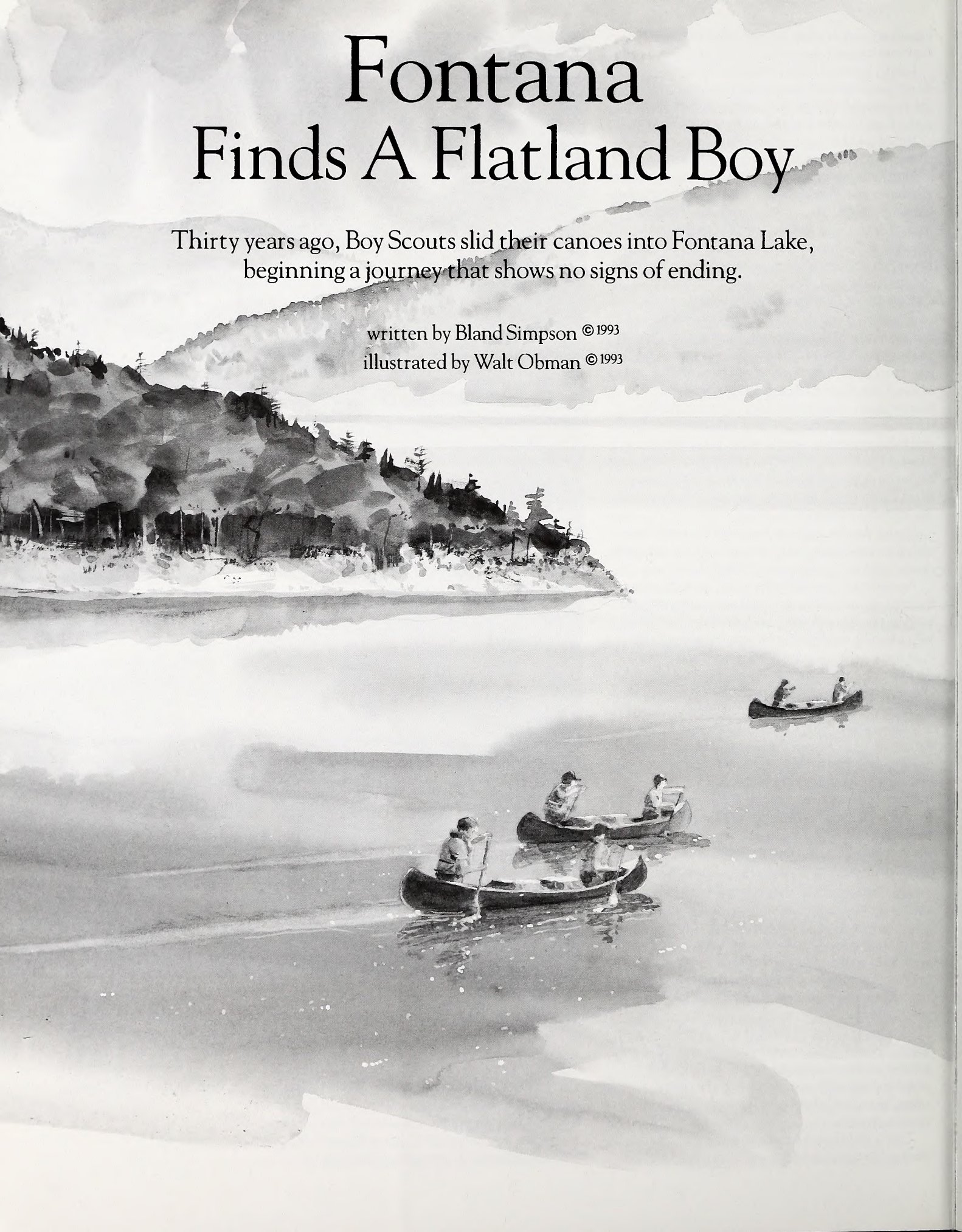
***Cattails provide** food and homes for many forms of wildlife, and this egret seems to know instinctively that it's very likely that a meal can be found in this maze of rushes.*

Doug Elliott's delightful new book, Wildwoods Wisdom: Encounters with the Natural World, *Paragon House, 1992, is available at most book stores or from the author in hardback ($22.95) and paperback ($15.00), plus $3.00 postage and handling.*

Fontana Finds A Flatland Boy

Thirty years ago, Boy Scouts slid their canoes into Fontana Lake, beginning a journey that shows no signs of ending.

written by Bland Simpson ©1993
illustrated by Walt Obman ©1993



For many years now, when I have put my feet up, my boot heels have come to rest atop a little four-legged pine footstool. The legs peg through a piece of slabwood, and, though the pine bark has grayed over time and lost its deep, almost purple, brown cast, the stool is as sturdy now as it was one dusky summer evening 30 years ago, when it caught my eye in a Cherokee trading-post and I paid out $8 of my $25 traveling money to have something fine to bring home from the mountains for my mother.

This was my first trip to the jump-up country of the Carolina Smokies, my first sighting of the big blue hills, the Beaucatcher tunnel, the cider shacks and the fabled mountain cattle with shorter legs on their uphill sides and all that. I was only recently removed from the flatlands of Pasquotank and was barely used to the red-clay rise and fall of Chapel Hill and Orange County. The Blue Ridge and the Smokies beyond, to a boy from the blackwater swamps, were simply grand.

It was a Scout adventure, and we had the gear. I borrowed a big rucksack, a pear-shaped pre-Kelty pack that very neatly put a metal bar in the small of my back, and my mother and I paid a call on Sarge Keller, Woollen Gym's quartermaster, to see if he had any kneepads the college boys had worn out and that might be tossed my way. He did, and though I thought it an unnecessary motherly precaution at that moment, I blessed Mama and Sarge quite often over the many miles I spent on bended knees in our seatless canoe.

There were two or three men and about 16 boys on the Fontana expedition, so we had a flotilla of some seven or eight boats. Most of them were Grummans, one of yellow fiberglass and another, my favorite, an old-timey-looking vessel of wood ribbing and black-painted canvas. When we had met as a troop in Chapel Hill and scrubbed and loaded the boats, we also went ahead and assigned them. I was one of the younger Scouts on this mission and didn't expect to get my choice, but to my surprise and delight Gordon Kage, the colonel's boy, and I got the black canoe.

We spent the first night at a Scout camp near Bryson City, where after an enormous evening downpour, we lay in the bunks of our three-sided cabins and listened to the dripping woods and to a rising, rushing creek nearby. The next morning we all rode down to the boat dock west of Bryson and put in there on the Tuckasegee River and began our westward trek to Fontana Dam, 30 miles away.

After a blessing of the fleet we were eagerly off, bound for a campsite at the mouth of Forney Creek about 6 miles distant. The Tuckasegee ran north for the first couple of miles, then made a sharp westward turn, and, as Gordon and I watched from a half-mile back while all the other boats disappeared around that bend, there and then the gods of all small craft revealed to us why it was we had gotten our choice of canoes:

It was heavy, nearly 50 pounds heavier than any of the other boats, and it leaked, nothing titanic in nature, just a slow percolation that then puddled and sloshed about and licked at our packs and sleeping bags, that saturated Sarge's pads and gave me water on the knee. And we were barely out of Bryson. When we rounded that first big bend, our comrades up ahead spotted us, and they weren't so far off that we couldn't hear their cheers, then their echoing laughter, and finally their crooning out the two words that were taunt and nickname all week long:

"Hey, Ka-ro! Hey, Mo-lasses!"

Had I known more, I would have asked that they speak to us in Cherokee and call us *Tsiksitsi*, or *Tuckasegee*, which meant "crawling terrapin." But I was new to these hills, and all I knew of Cherokee was the little pine footstool now stashed in the trunk of one of the cars. So we endured the slurs about our sluggishness, bailing away with a messkit cup and digging at the lake for all we were worth, which Gordon and I assured each other must be precious little.

When we finally reached Forney Creek, 20 or 30 minutes after the rest, we found all the tents already pitched, everyone lounging around, and, though we cast the most covetous looks in Scouting history upon those Grummans as we pulled our black beauty out of the water and

"As Gordon and I watched from a half-mile back . . .there and then the gods of all small craft revealed to us why it was we had gotten our choice of canoes."

flipped it and trudged into camp, we knew much better than to ask any of our fellows to look mercifully upon us, and swap.

Around that big fire that night there was talk of bear, and there was such keen interest and respect and apprehension among us that I know we all half expected a bruin or two to stalk into camp once we were asleep and let us know whose country this really was.

We knew. And we knew well enough to dufflebag our food and hoist and hang this aromatic sack in a tree whose lowest limbs were at least 20 feet. Next morning, after gallivanting around the falls and cascades just above Forney Creek's mouth into the lake, we packed some dehydrated chicken a la king for dinner and pancake mix for breakfast and then set out to conquer a mountain.

Hiking, walking, ambling, shambling, stumbling, our troop made a varied but steady headway up the big hill—High Rocks Mountain—through beech and hickory and oak, on logging paths not oft traversed these days, at the top of which we intended to plant our flag and spend the night and gaze down on all creation as soon as the morning sun lit up the world.

Halfway up High Rocks' southeastern spine we ran out of water. Sixteen thirsty boys with empty pint-sized canteens, and still 2,000 feet to climb. Clearly, the men hadn't counted on this, but if they were anxious, they masked it well. There would be water at the summit, at the abandoned firetower and ranger station our maps showed awaiting us.

We were trudging now, mid-afternoon, four or five hours till dark. There was no shortage of joking about how much water different ones could drink once we found water again—a gallon, a bathtub, a swimming pool, Fontana Lake itself! But after a spell everyone was sucking on twigs, doggedly moving upward and accepting with resignation our presence in the high-slope realm of intermittent streams. We studied the maps, hearts leaping at the sight of each stream that lay ahead in our path, hearts sinking as we experienced each successive one in the dry period of its intermittence. None of us, I daresay, had ever been so parched before. At least one boy, overcome by the exertion and thirst, broke down and cried.

At dusky dark we reached the peak, where the angle-iron tower loomed over the vine-covered and padlocked cabin. Round and round the cabin we went, expecting a spigot, if not a Halsey-Taylor-Warren-Ohio water fountain. But there was nothing, and we were very low, till one of the men cracked a cellar door and in the flashlight beam there before us lay the prize:

A full 200-gallon cistern.

I stood at the top of the firetower next morning, a solid mile above sea level, enchanted by

the sight of Fontana far below, a silver-gold shifting and shimmering over the fingers of the lake as the sun came on and climbed.

Off the other way to the north was Clingman's Dome, and on up the spiny border between Tennessee and Carolina, just 8 miles though we couldn't see it, was Mount Kephart, a 6,400-foot peak named for a patron American saint of way out yonder where there ain't nobody never is. Horace Kephart, a troubled soul who left his library directorship, wife and six children in St. Louis for the outback of early 1900s western Carolina, wrote works on camping that have informed much subsequent literature, including the *Boy Scout Handbook* we carried in our packs. And although it would be years before I would learn of this man and his Appalachian portrait, *Our Southern Highlanders*, I should have thanked him that day—had I known—for his helping hand in getting these Great Smokies set aside as a park for the nation.

Too much for a young and hungry boy to be aware of just then. Running through the dew that the night clouds had left us, we collected quart after quart of wild blueberries, mixed them up with the pancake batter, and then, in a real stroke, we made do for the cooking oil we didn't have by greasing our pans with syrup. What we created atop High Rocks was worthy of the State Fair—boy after boy got giddy off these sugar-imbued, crystalline-crusted flapjacks. We ate our fill of this sweet-bait, and started back for the mouth of Forney Creek a considerably happier troop than had arrived the night before.

Even if we weren't exactly Sherpas, we had endured a trial, slept uncovered under all God's stars, and climbed a real mountain that we could now come down in triumph.

The black canoe was still the heaviest and slowest, but Gordon and I bent to our task with a vigor we hadn't had before High Rocks. It rained, we bailed. And when one afternoon a high easterly blew down the lake, we rigged a big wind-grabbing sail out of our ponchos and paddles and for once caught up with and impressed the rest of the fleet.

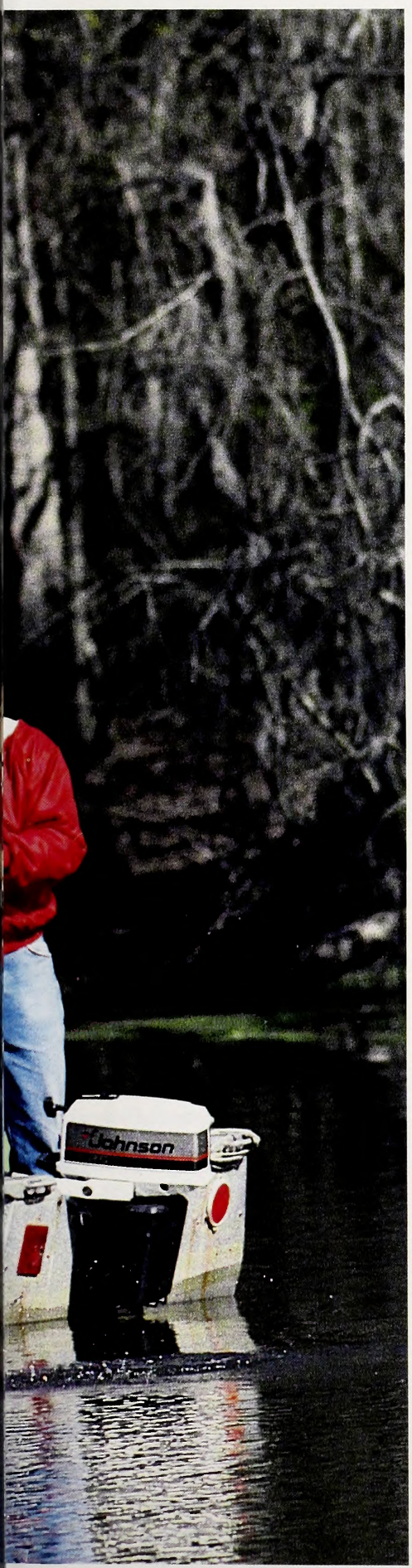
On the fifth day we reached the Fontana Dam, the highest in eastern America, fourth highest in the world. I remember staring goggle-eyed down the great swoop of cement at the fishermen far below. We didn't take time to wander into Fontana Village, the former construction camp rescued by tourists from the ghosts, but we learned that other Fontana Villages—a lumber-company tent town, a mining camp with its own hotel and cornet band—lay far below the waters that had drawn us here.

Now we pulled for home, still Karo and Molasses, still trailing most all the time, but now openly enjoying our tenure with the toughest craft. One drizzly evening in camp, Gordon and I conspired to patch the boat's leak, which had grown steadily worse. We scraped resin from a pine, heated it and effectively gummed up the little fissure, and so brought ourselves back to Bryson quite dry.

For most of us this was the longest time yet away from home and family and, too, the longest time between baths. When we bathed in the murky lake after loading the canoes but before lighting out for the low country, everyone's soap immediately sank and disappeared, all but mine: a big cake of Ivory nearly 200 proof pure. I couldn't wait to get back to Chapel Hill and tell all about it, the floating soap, the pine-resin repair, the 20 thirsty mountain miles, the 30 more in our slow boat to Fontana—and to bring home the pine-bark trophy.

Upon my weary return to the Piedmont from this week of being a diminutive mountain man, explorer and voyageur, I proudly presented my mother with the Cherokee footstool. I didn't know then that I had really bought it for myself—I was only 12. But she knew as soon as she saw the rustic little piece that it would best fit my room, just beyond the bunkbed, where I loved to sit in an old easy chair with the 1956 Hammond atlas that I still have, ever studying the wilderness and, like anyone who has ever been pulled forth by the bend in the river and the curve in the road, forever roaming the world.

VE IGO



Lightning on a Rod

Few fish furnish more thrills for sport fishermen than the American shad, and spring spawning runs in coastal rivers may be stabilizing after years of decline.

written and photographed by Joe Albea © 1993

Quietly, Bill paddled the canoe through a maze of fallen timber. Our destination lay ahead, an oxbow just off the main creek channel. As the canoe glided across the current, we could see an occasional silver flash below. The flash was unmistakable evidence that our quarry was in the river.

As we reached the oxbow, Bill tied up to a familiar cypress knee. We'd already tied on our lures, and we made our first casts, being careful to retrieve just fast enough to keep from hanging up. That is something you don't want to do, especially on the very first cast.

The fish are here—we can smell them—but whether they will take our offerings today remains to be seen.

Bill hooks a shad on his second cast while I'm still trying to free my spoon from a piece of carpet on the bottom of the canoe. He holds the sharply bowed rod high over his head while the shad strips off line, then leaps.

Before he has time to gain any line, the shad is airborne once again. This time I get a good look and determine the shad weighs at least 4 pounds, maybe a bit better. If Bill can hang on, we'll have our first roe shad of this young season.

It's the first week in April, but this is already our third white shad trip of the spring. Our previous two trips were successful—10 and 14 fish respectively—but they were all buck or male shad. The largest weighed about 3 pounds. For this trip, we had purposely waited two weeks in hopes that the bigger females would begin to show up. From the looks of things, we'd timed it just about right.

The American shad or white shad—or "silver bullet" as we affectionately call it—is the first fish of spring for many North Carolina fishermen. Not only do they arrive in the rivers early, they are active and strong fighters. They are also good to eat. White shad are often confused with hickory shad, their smaller cousins. Hickory shad often spawn earlier in the same rivers, and while they are sought by anglers on light tackle, they are not valued as highly for their roe and eating qualities as white shad.

***The arrival of** spawning American and hickory shad to the rivers of eastern North Carolina is a traditional harbinger of spring. As the water warms in March and April, fishing improves for these hard fighting fish. Various tributaries off the Neuse River are favored fishing spots.*

Beginning in late February or early March, the first white shad of the season begin to show up in the lower Tar, Neuse, Cape Fear, Trent, White Oak and other coastal rivers, then move upstream to spawn. Like the Atlantic salmon, the white shad is anadromous, returning each spring to the stream where it was born to spawn.

Several factors seem to control the timing of the migration and how good the fishing will be. I've encountered the best fishing when the water temperature ranges between 62 and 67 Fahrenheit. Some fish, primarily bucks, move earlier, but the peak migration will take place when the water temperature is in the mid 60s.

High, moving water is also important in most Carolina waters. When water levels are well below normal in early spring, you can expect a marked reduction in the white shad migration. Low water will prevent some shad from reaching their natal stream or tributary and consequently cut short their spawning run. There is no question that the fishing is better when the rivers are full and the current swift.

White shad mature and make their first spawning run from the ocean at 4 to 5 years of age. Survival rates after the first spawning run vary from year to year, but a white shad that weighs 7 pounds is approximately 8 years old and has made at least three spawning runs.

With miles of set nets, drift nets and trawlers out there, it's a wonder that any shad make it back the first time, much less for a second or third run.

In the 1970s and early '80s, the white shad population dropped to record lows and in some coastal rivers all but disappeared. The blame was placed on foreign trawlers fishing in some cases right off the beach. The trawlers caught thousands of pounds of white and hickory shad as well as many other species of fish, but after a 200-mile limit was imposed on all foreign fishing vessels, the shad population began to rebound. Even so, shad still face an uncertain long-term future as a result of pollution, dams and inconsistent stream flows during spawning.

In recent years, however the white shad population seems to have stabilized in most of the coastal rivers it favors, although weather and stream flows create fluctuations and uncertain fishing in some years.

As Bill brought his first shad to the side of the boat, I netted the fish. No question about it, this was the first roe shad of the season. Since Bill had promised an older friend a pair of roe shad, he decided to put it on the stringer.

Meanwhile, I made a short cast toward an area of calm water, where I had a hunch some shad might be resting. Almost immediately, something hit the silver spoon. In seconds the fish traveled 30 feet, and tossed the spoon in a leap. I never even had the chance to set the hook. Bill caught another shad, this one a buck.

As the sun continued to rise, rays of light cut through the canopy of cypress and hanging Spanish moss. With more light we knew our lures would become more visible to the fish, and we expected faster action.

I was using a single No. 0 Nungesser silver spoon with a feather, while Bill was using a tandem rig with a spoon and trailing shad dart. Since the water averaged less than 6-feet deep, there was little reason to add extra weight. In a deeper run, I will often count while the spoon sinks, then start the retrieve, but you're gambling when you do this until you figure out the water depth and amount of cover on the bottom. Still, I've always said that if you don't hang up at least several times during a morning of shad fishing then you're probably not fishing deep enough, and probably not catching any shad.

Although Bill's first two shad were caught on the spoon, I knew with the additional light his dart should attract attention. I stuck with my single spoon, however, because I have confidence in it.

My second good strike of the morning came moments later. This shad remained deep as it headed for the main creek channel. I wanted to keep the shad out of the faster moving water and held the rod tip high as I slowly tightened the drag. This brought the shad to the surface, but the fight was far from over. It was a roe, and I guessed her weight at close to 5 pounds. If I was careless, she could easily break my 6-pound test line. After four

***Shad darts** and small spoons are the lures of choice for shad fishermen using light spinning tackle. The size of the lures that anglers use depends on water levels and clarity. Bigger spoons or darts generally work better in faster or deeper water.*

***This white shad** fell for a small shad dart. The female, or roe, shad are especially prized by anglers. Care should be taken when landing all shad species, because the fish have delicate mouths and hooks can easily pull out. A medium-sized landing net works best for boating the fish.*

jumps and two more long runs, I finally got her to the net.

Meanwhile, Bill was battling his third fish of the day and had his hands full once again. His spinning outfit is almost identical to mine —a 5 1/2-foot, medium-action graphite spinning rod with a reel filled with 6-pound test monofilament. You don't "horse" 5-pound shad with this tackle. You simply cross your fingers and enjoy the show.

Fishing methods vary depending on where you happen to fish. Bill and I prefer to use the smaller spoons and darts, but are prepared to switch if the water conditions change. I personally prefer to use a single silver spoon, although I like a double-dart tandem rig in some situations. There will be days where you might try several combinations before you find the one that works the best.

The Cape Fear River is swift and deep below lock No. 1, as well as the two locks farther upstream. Here a larger spoon and heavier dart helps keep the rig down in the turbulent water and larger lures are also easier for the shad to see. Because of the swift water conditions, your tackle also should generally be heavier with 8- to 10-pound test lines a better choice. Some fishermen use 14-pound test on the Cape Fear.

Shad spoons and darts are not available everywhere, but most shops located near shad streams will stock proper lures in season. If the fish are really biting, however, supplies of the popular sizes can disappear quickly.

Some shad fishermen use ultra-light spinning gear, especially for hickory shad, and you can do the same in spots where the current isn't strong, the water isn't too deep and obstacles are at a minimum. Still, 6-pound test is about as light as you can go.

On the cool April morning we fished, we hooked 15 shad and landed eight including five bucks and three roe. As is normal, the action waned during the middle of the day. Fishing seems to be the best early and late in the day.

The good thing about shad fishing is that these silvery fighters appear in our coastal rivers just about the time that we're itching to get outside—somewhere, anywhere.

The irony is that what begins as a cure for cabin fever may wind up being the best fishing you enjoy all year. ☐

Muskie Club to Aid in Survey

Project Surveys Muskie Reproduction in French Broad River

Written and Edited by Vic Venters

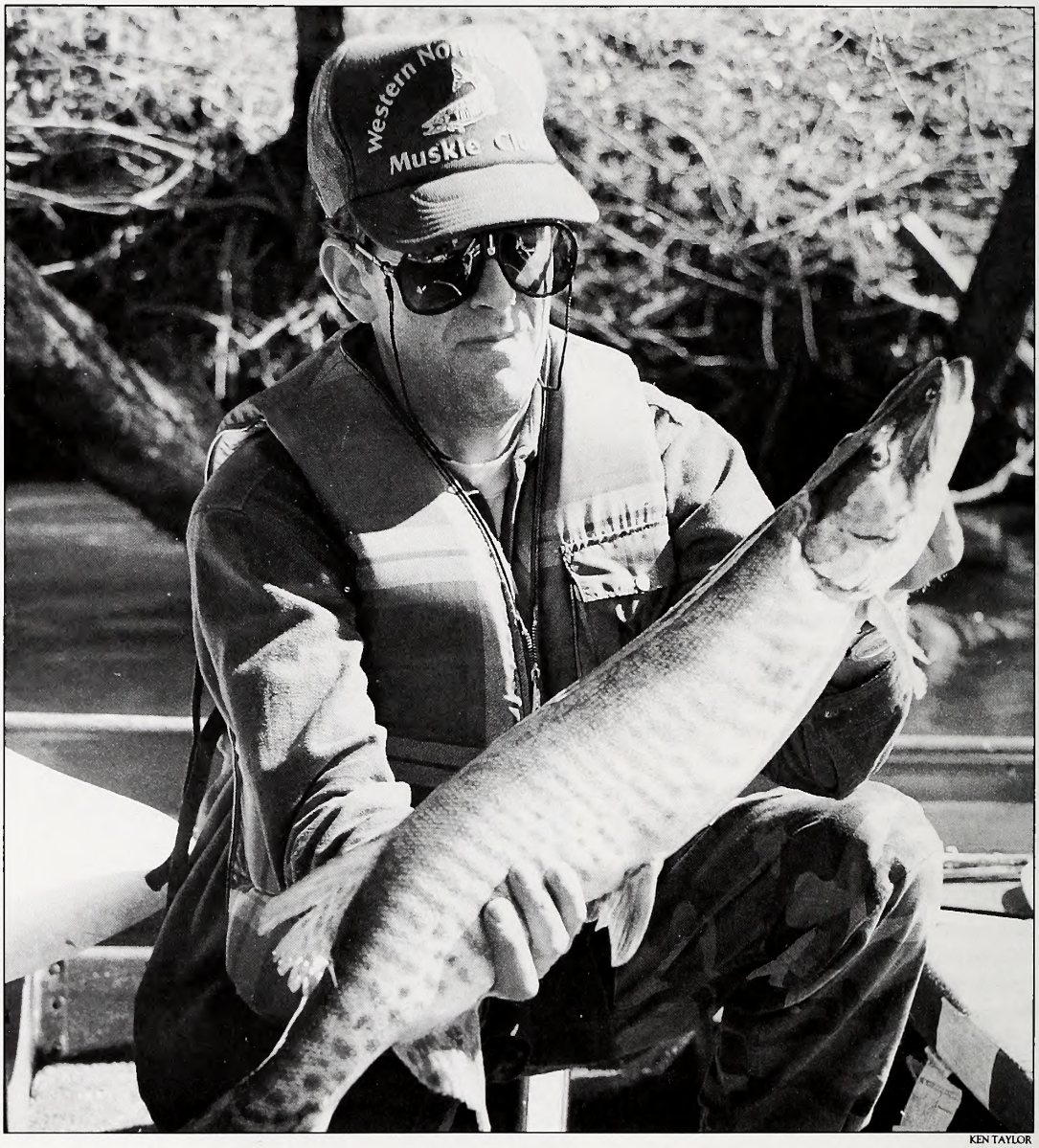
Are muskellunge reproducing in western North Carolina's French Broad River?

Dedicated muskie fishermen seem to think so, and with their help, biologists with the N.C. Wildlife Resources Commission are in the second year of a project designed to determine if the fish are reproducing in the river.

This spring, Wildlife Commission biologists and volunteers from the Western North Carolina Muskie Club will place special traps at various locations in the French Broad River between Brevard and Asheville. The boxes —a type of lighted minnow trap —are designed to attract and capture young fish, including, it's hoped, larval muskies. Last year, a similar experiment did not turn up any larval muskies.

"That doesn't mean there aren't any wild river-bred fish, and that's why we're coming back this year," said Micky Clemmons, the project biologist for the Wildlife Commission's Division of Inland Fisheries. "The Western North Carolina Muskie Club has been instrumental in providing manpower and funding for this project and we greatly appreciate their help."

Every two years, the Wildlife Commission stocks juvenile muskie into the French Broad River. However, anglers sometimes catch young fish that are smaller or larger than those stocked, or muskies whose size does not appear to approximate growth rates of previously stocked fish. "Because of the size of some young muskies that have been caught, that would seem to indicate we're getting some reproduction in the river," Clemmons said. "It would be a great sign of the river's recovery if we could find hard evidence of reproducing muskie populations."



KEN TAYLOR

***Since the 1970s,** muskellunge populations have made a big comeback in some western North Carolina lakes and rivers. This spring, Wildlife Commission biologists and volunteers from the Western North Carolina Muskie Club will be sampling the French Broad River to see if muskies are reproducing in the river.*

Muskelunge were once native to these waters, but they were virtually extirpated from western North Carolina due to water pollution. Muskies were reintroduced to several mountain lakes and the New, Nolichucky and French Broad rivers when pollution levels began to abate in the early 1970s.

Since then, a trophy fishery has developed, but populations are thought to be maintained largely by stocking. The French Broad is considered to have the most habitat available for both adult and spawning muskie. While the river doesn't have the aquatic vegetation beds used by spawning muskellunge in Northern states, the river has ample woody debris and leaf litter, another favored spawning habitat.

Anglers interested in muskie fishing or becoming involved with muskie management should contact the Western North Carolina Muskie Club, c/o Don Funderud, 9 Brook Avenue, Asheville, N.C. 28805.

Prize is Boat, Motor and Trailer

If You Pass Inspection, You Could Be a Big Winner

Boaters who are stopped by Wildlife Commission enforcement officers or who undergo a courtesy motorboat examination by the Coast Guard Auxiliary now have a reason to smile. Because they now have a chance to win a boat, motor and trailer.

Each time a person is stopped by an enforcement officer and their boat passes inspection, the boater will be given a post card, which is dated and certified by the inspecting officer. The boater can then mail this card and be entered into the drawing. The more times a boater is stopped and inspected, the more chances to win the prize.

The prize is a 14-foot McKee Craft Aruba, a Mariner 50 horsepower outboard motor and an accompanying Magic Tilt trailer.

"This campaign should make recreational boating safer in North Carolina by encouraging operators to carry all required safety equipment and to operate their boats in a responsible manner," said Col. Robert Tatum, Chief, Division of Enforcement. "It also should make these safety checks less of a bother to boaters who are obeying the regulations."

The boating-safety campaign begins this spring and will run through Labor Day weekend. All entries must be postmarked by October 1. To be eligible to win, a person must be 21 years old.

The campaign is being sponsored by the N.C. Wildlife Resources Commission, the U.S. Coast Guard Auxiliary, U.S. Power Squadrons, McKee Craft, Mercury Marine and Magic Tilt Trailers. The boat, motor and trailer were donated to the program by their respective manufacturers.

Employees of the N.C. Wildlife Resources Commission and their families and CME inspectors of the U.S. Coast Guard Auxiliary are not eligible for the drawing.

KEN TAYLOR

***Boaters who pass safety inspections** will get a chance to win this 14-foot McKee Craft Aruba plus a Mariner 50 horsepower outboard motor and the Magic Tilt trailer in a drawing. The more times boaters are checked and pass, the greater are their chances of winning.*

Group Seeks One-Time Contribution Only

Trust Formed to Acquire Wildlife Habitat in State

A new private trust has been founded to acquire, manage and protect wildlife habitat across North Carolina. The N.C. Wildlife Habitat Foundation was conceived last year by former Wildlife Commissioner Eddie Bridges of Greensboro. The trust was founded last July and is chaired by W. Harrison Stewart of Greensboro. By mid-February, the group had collected over $50,000 in pledges and contributions. Their first goal is to reach $100,000 by July 1, 1993, and hopes are to eventually raise $1 million or more. All receipts will be placed in an endowment trust fund. Only the interest earned from the fund will be expendable.

All administrative work is being done by volunteers, Bridges explained, so that contributions will go toward habitat acquisition only. "We will not be purchasing or holding land ourselves," he said. "Instead, we will financially assist reputable conservation organizations and groups in acquiring, managing and protecting wildlife habitat." These could include groups like Ducks Unlimited, National Wild Turkey Federation, the Nature Conservancy, and the N.C. Wildlife Resources Commission, among others, Bridges added.

Memberships and contributions are sought on a one-time basis only. "I think a lot of people get tired of constantly being bombarded for money from nonprofit groups," Bridges said. "Our membership involves a one-time contribution and you will not be solicited again."

So far, the trust has been supported by corporations and local wildlife clubs, as well as by numerous individuals. The Fund has five levels of membership: Corporate benefactor, $2,000; corporate or group life sponsor, $1,000; individual benefactor, $500; individual life sponsor, $100; and contributor, $20.

Eddie Bridges was also responsible for helping found the Wildlife Commission's Endowment Fund, which has raised over $27 million since 1981. Like the trust, only the interest can be used.

Checks should be made payable to the N.C. Wildlife Habitat Foundation or the N.C. Wildlife Habitat Foundation, P.O. Box 564, Greensboro, N.C. 27402.

Book Review

Essays From Janet Lembke: Dangerous Birds

Dangerous Birds by Janet Lembke. Published by Lyons & Burford. Hardcover, 179 pages, 1992. $21.95.

Janet Lembke's new book of essays will delight readers of her previous books, *River Time* and *Looking for Eagles*. It will also gain her an abundance of new readers, for she is proving to be one of today's most gifted nature writers.

Several years ago, Lembke moved to Great Neck Point along the lower Neuse River, surely a strange choice for a translator of classical Greek literature. She was soon captivated by the river and its people, by its fish and wildlife and by the larger forces that affect them all in this remote area of the state.

Dangerous Birds is a collection of essays on birds, but that's like saying that the subject of *Moby Dick* is whales. Birds are just the beginning of Lembke's leisurely rambles over topics that include river life, ancient mythology and contemporary conservation issues. Her goal: to see birds as they are, but also to see them as they've been transformed by human imagination.

It's a goal that she achieves more times than not. Her writing about birds themselves is polished and full of wonderful comparisons. Grackles: "They glean fallen seeds from the earth like black ants polishing the last scraps off a well-picked bone." Canvasbacks: their "profiles are almost Greek."

And she is alert to conservation matters. Referring to companies that are given permits to dump heavy metals into the Neuse, she protests: "What can the bureaucrats be thinking of?"

Her title essay is a roller coaster ride through such seemingly dissimilar topics as the aggression of robins and blue jays, the illegal Down East custom of eating songbirds, and local sentiment against endangered species protection when it holds up construction projects. It all leads to a big question: "People or birds? Which are more important?"

Lembke's answer: Both. Not one or another, but "one and another, one and all of the creeping, swimming, running, flying, and green-growing things."

It's an answer that has the heft of rightness about it, as do so many things in this rewarding book.

—Lawrence S. Earley

Habitat Column Changes Page

With this issue, we've temporarily moved our *Wildlife Through The Year* habitat column from p. 32 to p. 31 to make room for the promotions page for the Wildlife Commission's new conservation education products. The column will return to its normal location in the July issue.

Calendar

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact before traveling to an event. Listings for this calendar should be conservation-oriented and should be sent four months in advance.

April 3-4

The fifth annual Save Our Sounds Celebration will be held at the Kerr Scott building at the N.C. State Fairgrounds in Raleigh. Activities include environmental and water-quality exhibits, boat building and decoy carving, coastal folklore, and educational exhibits for children. The Celebration is sponsored by WRAL-TV, the N.C. Forestry Association and a variety of nonprofit and governmental organizations. For more information, contact Save Our Sounds at (919) 821-8790.

April 14-18

The 23rd annual Grifton Shad Festival features numerous exhibits, food and contests. For more information, contact the Grifton Shad Festival, P.O. Box 928, Grifton, N.C., 28530, or call (919) 524-4075.

April 23-25

The N.C. Wildfoods Weekend in Reidsville will feature edible wild plant identification and cooking, rare plant identification, bird and tree walks, and a night hike. For more information, contact Sandra Maus at (919) 342-1235.

April 24

The N.C. Coastal Federation will hold its annual celebration at Hammocks Beach State Park. Activities include educational field trips and activities, lunch and a presentation by Jonathan Howes, the new secretary of the N.C. Department of Environment, Health and Natural Resources. For more information, call (919) 393-8185.

April 24

The Quail Unlimited Fun Shoot will be held at Deep River Sporting Clays between Sanford and Raleigh. All proceeds go to the N.C. Council of Quail Unlimited and all monies will be used for conservation work in North Carolina. Prizes will be awarded and the general public is invited. For more information, contact Dave Heeter at (919) 834-8684.

April 24-25

The N.C. Herpetological Society will hold its annual spring meeting at the Schiele Museum in Gastonia. The public is welcome. For more information, contact the N.C. Herpetological Society, N.C. Museum of Natural Sciences, P.O. Box 27647, Raleigh, N.C. 27611, or call (919) 733-7450.

Support the Nongame Fund

Each year, North Carolina residents may check a line on their state income tax form and designate any or all of their refund to the Nongame and Endangered Wildlife Program. Your support has meant that many endangered species have a chance for survival. You can make a contribution directly or through the income tax checkoff to the Nongame & Endangered Wildlife Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188.

NORTH CAROLINA NONGAME & ENDANGERED WILDLIFE FUND

Early Registration Due May 1

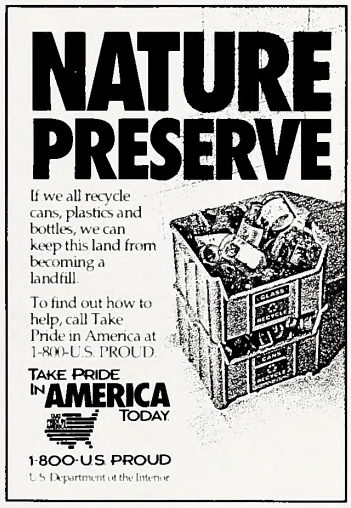
Fur, Fish 'N Game Rendezvous Set

The 11th annual Fur, Fish 'N Game Rendezvous camp will be held June 20-25 at the Millstone 4-H Camp near Ellerbe.

At the Rendezvous, campers from ages 11 to 15 study topics such as wildlife and forests, 4-H activities, environmental ethics, wildlife photography, fishing, archery, riflery, canoeing, camping, orienteering and first aid. Certified hunter-safety classes will be taught. All classes are taught by qualified professionals in their respective fields.

The Fur, Fish 'N Game Rendezvous 1993 is sponsored by the N.C. Cooperative Extension Service, the N.C. Wildlife Resources Commission, the Wake County Wildlife Club, the N.C. Wildlife Federation and the N.C. Bowhunters Association.

Deadline for early registration will be May 1. The early fee is $140 and must accompany the registration form. After May 1, the cost will be $155. Space is limited to the first 100 applicants and to the new Fur, Fish 'N Game campers. For more information, contact Leon Harkins at (919) 515-5575 or your local county 4-H agent.

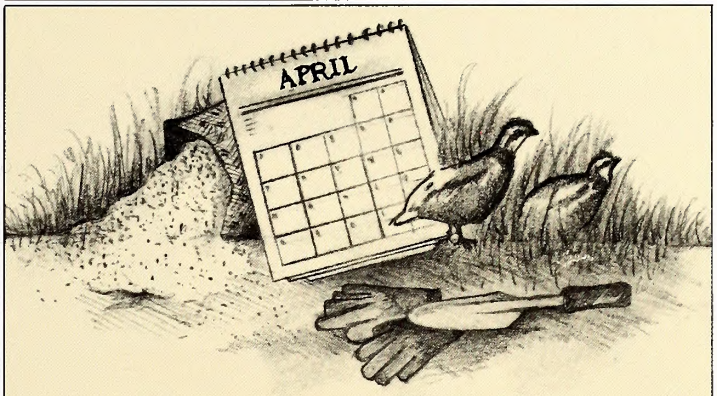


Wildlife Endowment Fund Report

January 1993

Principal Balance
$17,915,394.30
Interest Earned
$10,917,029.68
Total Receipts
$28,832,423.98
Interest Used
$4,123,817.48
Fund Balance
$24,708,606.50

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.



Don't Overlook This

by Vic Venters

One of the most common faults of amateur habitat managers is thinking about wildlife needs only for one season of the year. The net effect of such reasoning can be a plethora of one type of habitat needed during winter —food plots, for instance—while wildlife habitat needs for the rest of the year go unmet. Hence, populations can remain small despite hard and concentrated effort by the landowner or manager.

Crops left as food strips along field borders are a prime example. While leaving several rows of unharvested soybeans or corn along field borders does provide an excellent winter food source for game such as quail and rabbit, as well as for songbirds and other wildlife, why not go one step further and manage these food strip to provide habitat all year long? It's very easy.

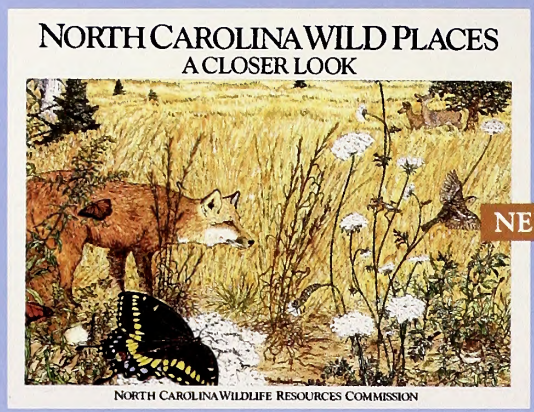
Many farmers and landowners don't like weeds—any of them, anywhere on the farm. As heretical as it may sound, though, consider not spraying herbicides or pesticides on any rowcrops you plan to leave as wildlife food. The resulting weedy growth in those selected strips will provide wildlife with several critical year-round habitat needs. One of the most important is grassy breeding habitat, which is in short in supply on many of today's farms.

Just as important are bugging areas, another often overlooked habitat need. During late spring and summer, female quail need the high energy and calcium provided by a insect diet for egg production and healthy broods, and a steady diet of insects is absolutely critical for hatchling quail to grow and thrive. In the fall and winter, the weedy areas left in your crop strips will provide many species of wildlife with extra cover from predators while they are feeding.

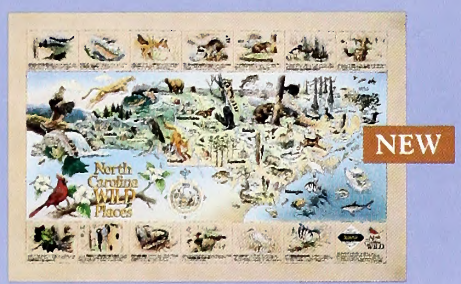
This could also save you on some herbicide costs. Any problem weeds or pests that threaten to invade your crops can be dealt with as needed on a case-by-case basis using guidelines of Integrated Pest Management. By simply eliminating farm chemicals from the few rows you plan to leave, you can create habitat that serves wildlife needs all year long, rather than one need in one season.

The N.C. *Wild* Store

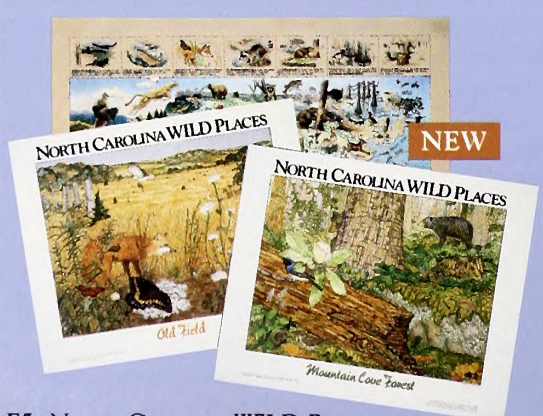
Take advantage of these great items and you'll support conservation education throughout North Carolina. Proceeds from the sale of these publications will support the development and production of educational projects and programs.



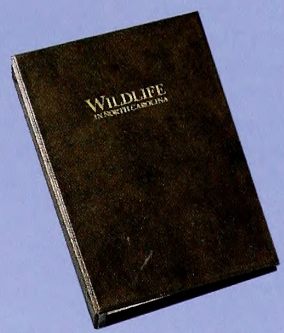
E1. NORTH CAROLINA *WILD* PLACES: A CLOSER LOOK: *Easy-to-read text and Anne Marshall Runyon's delightful illustrations make wildlife habitats come alive in this 82-page book. Discusses 13 habitats across the state.*



E2-4. NORTH CAROLINA *WILD* PLACES MAP PRINT: *Charming, signed limited-edition art print showing North Carolina's WILD places as seen by artist Jackie Pittman. 1,000 regular and 100 artist's proof prints. Also available as a poster. 36" x 24". Shipped flat.*



E5. NORTH CAROLINA *WILD* PLACES POSTERS (SET OF 3): *Posters of "Old Field" and "Mountain Cove Forest" from* North Carolina WILD Places: A Closer Look. *Shipped folded with poster version of* WILD Places Map.



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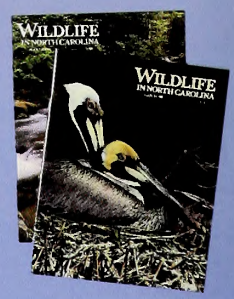

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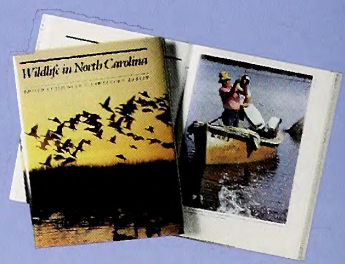

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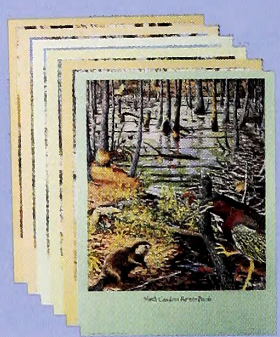

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P1-P2. N.C. WILD ART PRINT "FEELIN' LAZY": *All proceeds from the sale of these prints will benefit Project WILD and other wildlife programs. 24" x 18".*

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M3. *Wildlife in North Carolina* Book. $12.

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E1. *North Carolina WILD Places* Book. $10.

North Carolina WILD Places Map:

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E3. Limited Edition. $25.
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Send your order to: Educational Products-WILD, Division of Conservation Education, N.C. Wildlife Resources Commission, 512 N. Salisbury Street, Raleigh, NC 27604-1188. Product offerings will expand periodically. For an updated product list, send a self-addressed stamped envelope to: Product Information, N.C. Wildlife Resources Commission, 512 N. Salisbury Street, Raleigh, N.C. 27604-1188.
We do not bill. All orders must be prepaid. Do not send cash. Please allow 6-8 weeks for delivery on all magazine subscriptions, 4 weeks for educational materials. $20.00 service charge for returned checks (N.C.G.S. 25-3-512).

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Complete and return entire page with proper payment (or credit card information). Our mailing address is: Wildlife Endowment Fund, License Section, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Archdale Building, Raleigh, N.C. 27604-1188. Office is located at 322 Chapanoke Rd., Raleigh, N.C. 27603. Please make checks payable to the Wildlife Endowment Fund. $20.00 service charge for returned checks (G.S.25-3-512).

	PRICE
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☐ Lifetime Sportsman Infant (under 1 year of age) (Application must be received before one year of age)	$200.00
☐ Personalized Lifetime Sportsman Infant (under 1 year of age) (Application must be received before one year of age)	$205.00
☐ Lifetime Sportsman Youth (age 1 through 11) (Application must be received before 12 years of age)	$350.00
☐ Personalized Lifetime Sportsman Youth (age 1 through 11)(Application must be received before 12 years of age)	$355.00

A copy of a certified birth certificate (or the mother's copy) must accompany applications for sportsman's licenses for infants and youths. Please note: Hospital copies will not be accepted. Also, birth certificates cannot be returned.

Pending satisfactory completion of the hunter safety course, persons who possess infant or youth licenses may exercise the privileges thereof when accompanied by an adult at least 21 years of age, who is properly licensed to hunt in North Carolina. "Accompanied" is defined as being able to take immediate control of the hunting device.

☐ Lifetime Sportsman (residents only) (age 12 or older) (includes basic hunt and fish, big game, game lands, primitive weapons, trout, N.C. waterfowl [Federal waterfowl stamp is mandatory and must be purchased separately.]).	$500.00
☐ Personalized Lifetime Sportsman (residents only) (age 12 or older)	$505.00
☐ Lifetime Nonresident Sportsman (age 12 or older) (includes basic hunt and fish, big game, game lands, primitive weapons, trout, N.C. waterfowl [Federal waterfowl stamp is mandatory and must be purchased separately.]).	$1,000.00
☐ Lifetime Comprehensive Hunting (residents only) (includes basic hunt, big game, game lands, primitive weapons)	$250.00

On or after July 1, 1991, a person, regardless of age, may not procure a hunting license or hunt in North Carolina without producing a certificate of competency for completing the hunter safety course or a hunting license effective prior to July 1, 1991, or making out a written statement that he had such a license.

Check appropriate block and attach required copy

☐ Copy of Prior Year Hunting License ☐ Copy of Hunter Safety Certificate of Competence

☐ In lieu of copy, I am completing a written statement (complete below).

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(First) (Middle) (Last)

Address: _____
(Street/R.F.D.) (City) (State) (Zip)

Date of Birth: _____ (Month/Day/Year) Social Security No.: _____ Driver's License No.: _____

Male: ☐ Female: ☐ Telephone Number: _____ County: _____

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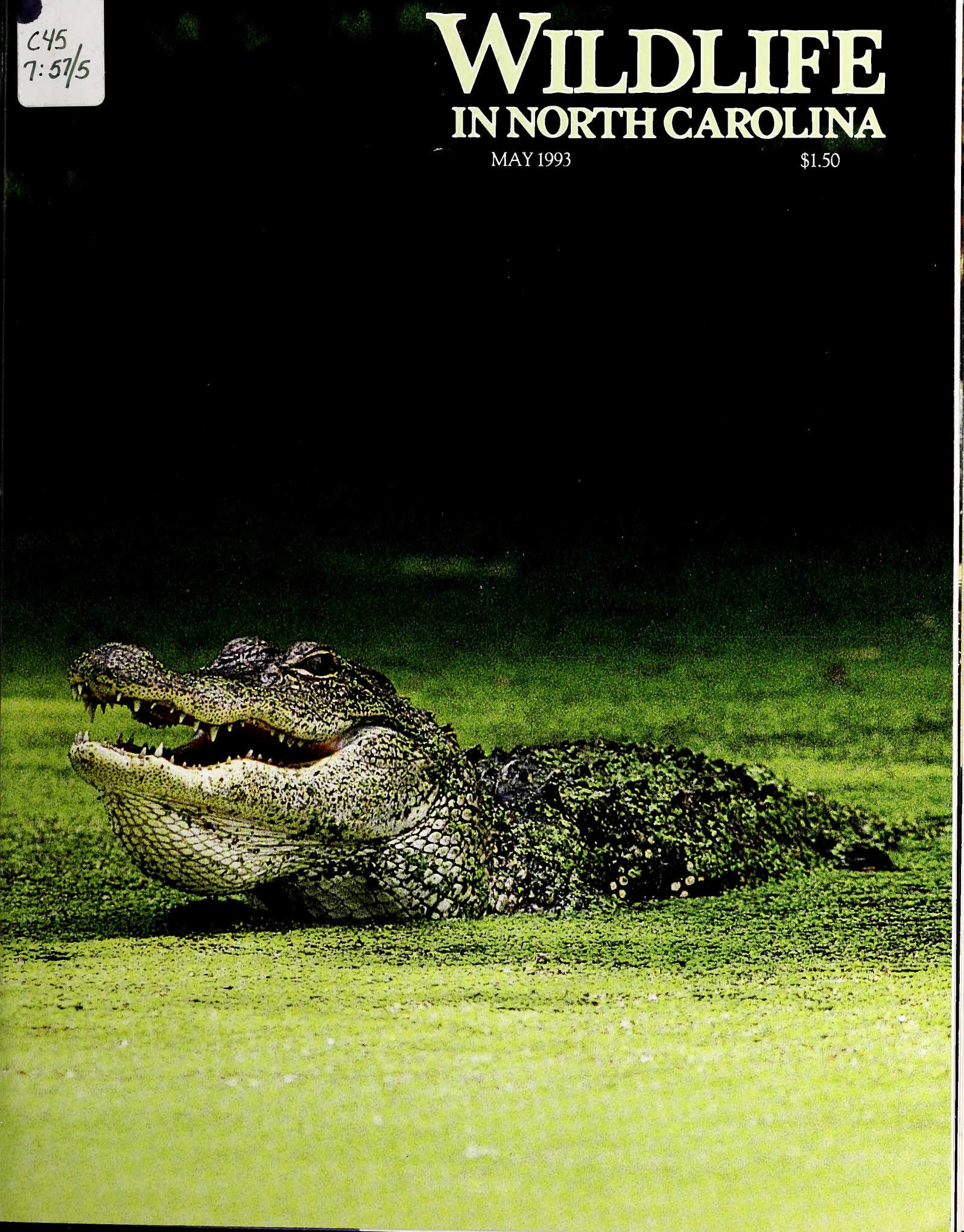


Quest for Crustaceans

by Jim Dean

Louisiana is the only place I've ever been where women keep bottles of Tabasco sauce in their purses. "Cooks hardly ever use enough," was the explanation I got, along with a look that said they'd leave home without lipstick before they'd do without the famous hot pepper product of Avery Island. Nor do Gulf Coast men sally forth without their heat. One of my Cajun buddies carries a bottle of Tabasco in his pickup, and sprinkles it on everything from country store crackers and pig's feet to crawfish. I doubt that's unusual.

When I first visited Louisiana over 15 years ago, this love affair with Tabasco was but one of many clues that I was in a different land with a different culture—one that I quickly became very fond of. On subsequent visits, I have been pleased to see Louisiana successfully fighting the rampant homogenization of America that blends distinct cultures into boring sameness. There's a lot to be said for preserving local customs, colorful accents, regional music and unique foods and, of course, that's just as true in North Carolina as it is in Louisiana or anywhere else.

ILLUSTRATED BY JACKIE PITTMAN

As for crawfish, however, I think it's high time to spread that particular regional favorite around. When I came back from the bayou country, I was convinced an economic windfall lay in establishing trade relations with Louisiana whereby we would ship a little of our wonderful eastern North Carolina, vinegar-based pork barbeque to Cajun country in exchange for live crawfish and Lafayette's tastiest mudbug recipes. I gained weight just thinking about it.

Until fairly recently, however, thinking about it was all I could do. If North Carolinians wanted to eat fresh crawfish prepared Cajun-style, we pretty much had to travel. That's changing. Commercial crawfish farming has been underway in North Carolina for several years now, and though it has gained little more than a foothold so far, it shows great promise (see John Manuel's article on page 21).

No doubt there are some who will wonder why so much fuss is being made over an ugly critter that burrows in the ground, leaves mud chimneys in your yard and tries to pinch you when you pick it up. "People really eat those things?" they ask. Of course, taste is a matter of, well, taste. Even so, I have never met anyone who has eaten a red swamp crawfish who did not think it was one of the premier foods of all time.

Let me tell you about my introduction to mudbugs. Sometime in the mid-1970s, several of us flew to New Orleans for Mardi Gras, then drove west to Lafayette where we hoped to immerse ourselves in more rural versions of this annual Cajun celebration. Cajun, by the way, is a corruption of the word "Acadian." You may recall Longfellow's epic poem, *Evangeline*, that recounts how the Acadians were forced out of Nova Scotia and finally settled in the bayous of Louisiana. That accounts for the French influence in Louisiana, an influence that is particularly well-established in cooking.

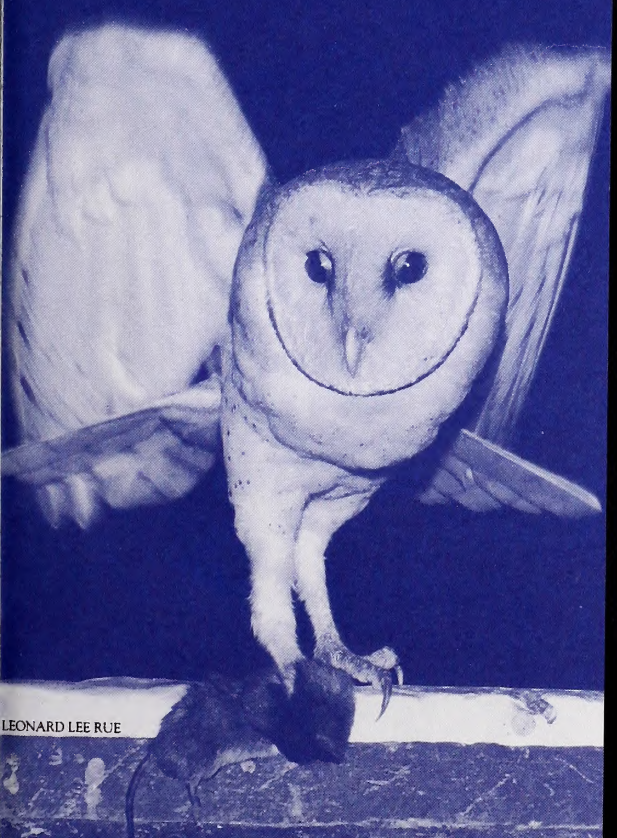
During our Mardi Gras trip, Lafayette became the center of an epic engorgement that began at Pat's in Henderson on the edge of the Atchafalaya Basin where we ate crawfish prepared seven different ways. I particularly remember the etoufee, a roux made essentially of tomatoes, garlic, onions, celery and oil simmered with crawfish tails and served over rice. There was also crawfish pie in delicate pastry along with memorable bisques and gumbos. For three glorious days, we fed more or less from breakfast to bedtime on crawfish fixed innumerable ways. On Day Two, Cajun accordions serenaded us at a wildlife refuge cookout while we consumed baskets of highly seasoned crawfish and local yeast products (Jax and Dixie) iced down in a Grumman canoe.

The night before we left, we went to Robin's (pronounced Row-Ban) in Lafayette (Laugh-e-et) where I was able—my stomach having been adequately stretched by intensive training—to decimate somewhere in the neighborhood of a half acre of boiled (bawled) crawfish. We peeled the tails, sucked the fat out of the heads and left enough spent shells to qualify a Dempster Dumpster for Super Fund cleanup. Then, we settled our distended interiors with strong mugs of chicory and coffee. I have never been the same since.

What flavor and texture could fuel such a feeding frenzy? For those who haven't eaten a crawfish, imagine a morsel of meat—the tail—that closely resembles a shrimp. White, firm yet tender, bite-sized, no bones, no shell, no vein. But instead of tasting like shrimp (and Heaven knows shrimp are good), this succulent morsel is lobsterlike, slightly sweet and nutty. Put this meat into one of dozens of Cajun recipes and nothing can match it.

If the rising mudbug industry in North Carolina is increasingly able to deliver live crawfish to you and to restaurants, I think you will discover that I have spoken the truth. And maybe it's past time for that, too.

Predators Belong



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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and also to the environment we share with them.

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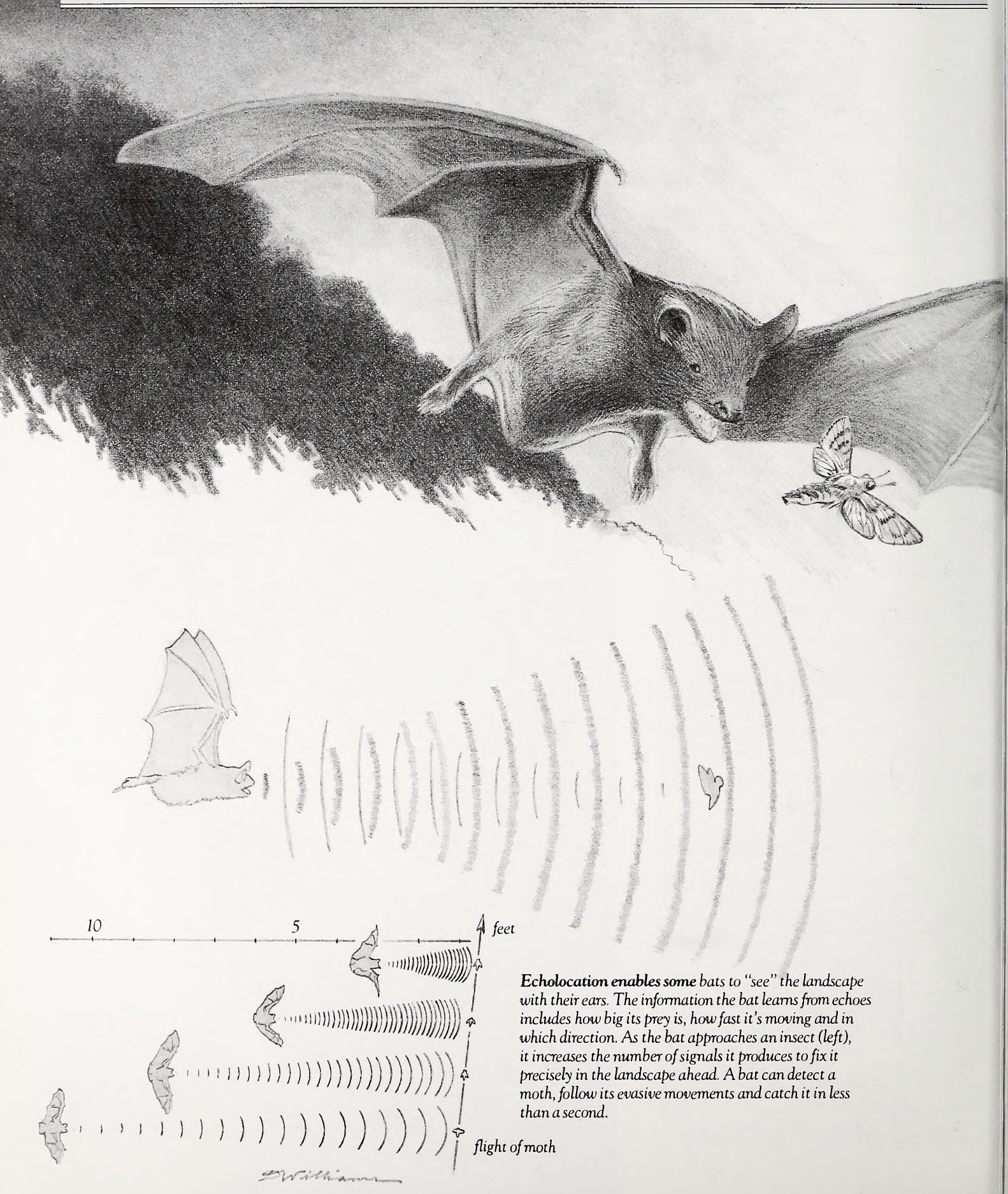


Echolocation enables some *bats to "see" the landscape with their ears. The information the bat learns from echoes includes how big its prey is, how fast it's moving and in which direction. As the bat approaches an insect (left), it increases the number of signals it produces to fix it precisely in the landscape ahead. A bat can detect a moth, follow its evasive movements and catch it in less than a second.*

Blind as a Bat?

written by Lawrence S. Earley/illustrated by David Williams

***Bats' unique ability** to hunt in the dark enables them to exploit night-flying insects, a resource other animals can't pursue. When insect-eating bats leave their roost, they use the echoes from the ultrasonic sounds they emit to find food and avoid obstacles. Using sound waves in this way is known as "echolocation."*

How do bats get around on nights when there's not even a thin sliver of moon to see by? This is a question that has perplexed naturalists since ancient times. Scientific inquiry into this question began in the late 18th century with the famous investigations of the Italian mathematician and natural scientist Lazzaro Spallanzani. He wondered whether bats relied on supersensitive eyesight to hunt and avoid obstacles in the dark. To find out, he surgically blinded some bats and found that they caught just as many insects as did normal bats. Obviously bats were sorting out their landscape—navigating and catching prey—without relying on vision. But what sense were they using?

A few years later, another scientist followed up Spallanzani's experiments by plugging the ears of bats. He found that they crashed into objects while flying in the dark and were unable to hunt. Thus, the bats were somehow using sound to orient themselves in the dark. But how?

The puzzle continued to attract the attention of scientists, but it wasn't unraveled conclusively until the 1930s when research at Harvard University confirmed that certain bats actually emitted high frequency sounds that bounced off objects and returned to the bats as echoes. (Sounds that are above the human range of hearing are called high-frequency, or ultrasonic, sounds.) These echoes are full of information for the bat—whether an object is in its path, where it is, how big it is, and whether it's something to eat—even whether it's a moth or a mosquito!

Scientists call this ability "echolocation," meaning that a bat locates objects by emitting ultrasonic sounds from its mouth or nose and listening for the echoes. In effect, bats are using echoes to "read" their landscape. Using only their ears, they are "seeing" in the dark.

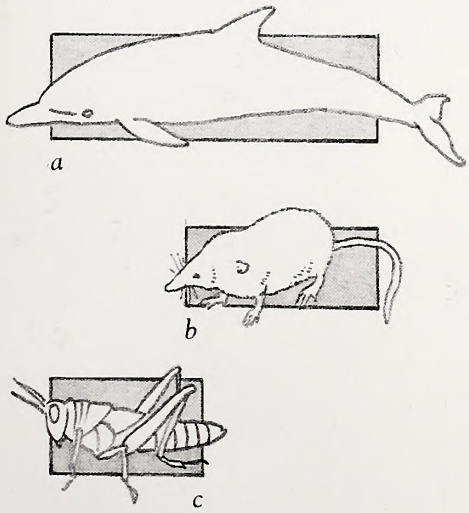
Of course, it's a lot more complicated—and more astonishing—than that. Because these are high-frequency signals that bats emit, they don't carry over long distances. Many bats can't really sense objects farther than 10 to 15 feet away, and some species have to be closer than that. Thus a lot happens in a very short time. Between the emission of a pulse signal and the reception of an echo, only six milleseconds (six-one thousandths of a second) may elapse. A bat "locks on" to an object, decides it's edible, follows its evasive maneuvers and catches it—all in less than a second!

Though short, this period has different phases as the bat increases the number of ultrasonic signals it produces to close in on its prey. Scientists distinguish between the "search" phase, where the bat is probing the landscape ahead by emitting 15 pulses per second, the "approach" phase (25 to 50 pulses per second), and the "terminal" phase (as many as 200 pulses or more per second). In human terms, of course, all three of these phases occur practically simultaneously.

Once a bat locks on, most insects don't have a chance to escape. However, some moths detect the ultrasonic signals of a hunting bat and take evasive action. Other moths actually send out ultrasonic signals of their own that "jam" the bat's signals.

Not every sound a bat makes is inaudible to us. In its roost, a bat peeps, squawks and utters other sounds to communicate with other bats.

Most of us rely so much on our sense of sight that it's difficult to appreciate how much information a bat can gather just by listening. Perhaps there's a lesson in that.



***Other animals that** use ultrasound include whales and dolphins (a), shrews (b) and insects such as moths, grasshoppers, crickets (c) and cicadas.*

BUGS, & BACON BREAM

To reap a bonanza in bluegills and other panfish, try adding a bit of pork to a sinking fly. It's deadly.

by Barry G. Davis © *1993*

Flick. Splash. *Bang!*

The tiny spinner, tipped with a twister tail, hit the water near the base of the cypress and was nailed before it had a chance to settle amidst the knees. The rod bent sharply, and the fight, though brief, was spirited. First, the fish tried to go around the tree. Then, when rod pressure put an end to that idea, it tried to hang the line in the knees. That didn't work either, and the fat, dancing fish was soon hoisted over the gunwale to join a collection of its cousins in the cooler.

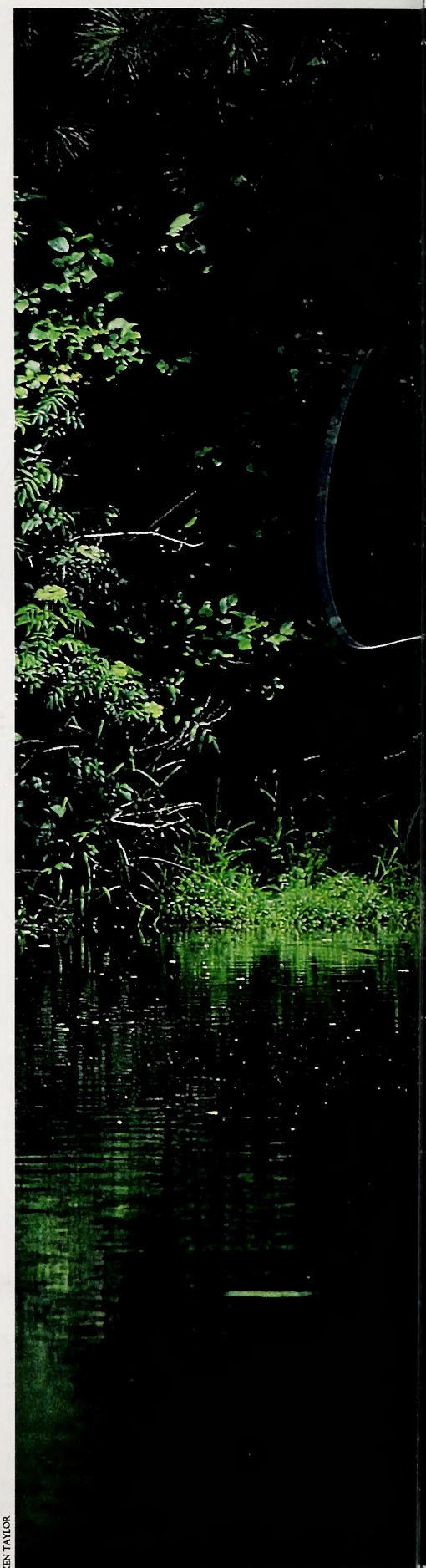
On the next cast, the lure bounced off the bark of another cypress 5 yards farther along the cove, and settled to the shallow bottom. As it was lifted to begin the retrieve, the line zigged sideways. A slight snap of the wrist, and the battle was replayed once again.

It seemed that every cypress tree, and every bit of overhang or blowdown along the shore of that old backwoods millpond, held a keeper. And, on a late spring afternoon with the sun warm on my back and the breeze just a soft whisper through the woods, they were all "in the mood."

Bream are "everyman's" fish, especially if you're applying that colloquial term to the bluegill as is usually the case. Depending on where you live, the term bream may apply to any of several popular sunfish, or to all of them. For most fishermen, however, bream means bluegill, and virtually every angler I've ever questioned—those who didn't happen to be born with their feet in the saltwater of the ocean—started out fishing for them with an old cane pole, strip of line, hook, bobber and can of bait. The location may have been a farm pond or a lake, a slow-moving creek or the shoreline of a river. But, without exception, bream were the target.

***A sinking hard-bodied** black ant is a good fly by itself, but when tipped with a piece of white pork rind (below), it is almost irresistible to bluegills and other panfish. Learning to cast a fly rod for bluegills (right) is as easy as spin-fishing, especially since long casts and pinpoint accuracy aren't necessary.*

BARRY DAVIS



KEN TAYLOR

NC 4800 AN

BARRY DAVIS

A tiny strip of pork rind *not only improves the effectiveness of ants and other sinking flies, it can also enhance a floating bug. Fish seem to like the taste and feel of rind, and will hold the fly longer, giving anglers more time to set the hook. Fly-sized strips can be cut from larger pork rind strips designed for bass.*

Most of those fishermen soon got wrapped up in more glamorous species as their horizons and interests expanded. But, with no great sense of irony and certainly no disdain, most also returned to periodic bouts with the little sunfish that started it all. Maybe it's the fond memories. Or the tradition. Or, more likely, because bream, ounce for ounce and pound for pound, offer more pure enjoyment per minute of time spent on the water than any other species. For sure, they're the most plentiful and most accessible fish throughout most of the state.

Bream fishing has always been pictured as a cane pole/cricket or minnow type of thing. And, in fact, probably more frying pans have been filled that way than any other. Some of us, however, have personalities too antsy to wait for the bobber to dance. We have to be doing something— casting, probing, changing technique or baits—to relieve our nervous energy and satisfy our curiosity. Whatever the motivation, it's as much fun to catch bream on a spinner, a mini-jig or a popper as it is for the cane pole folks to hook them on a cricket or worm.

Generally, success rates with artificials are not as high. I use ultra-light spinning gear most of the time: a rod 5- to 5 1/2-feet long that weighs next to nothing, and tiny reels with 4- or 2-pound test line. I like 1/16th-ounce, safety-pin type spinners dressed with short plastic twister tails or grubs. Mini-jigs with panfish-sized pork rind are also good, and I sometimes even use tiny minnow-type lures. Fishing artificials keeps me active, but it is only on the odd day that I'll do as well as someone fishing the real thing.

On the other hand, there are always those rare fishermen who do much better. There are experts, for lack of a better term, who have lifted their games a notch higher than the rest of us. Whether or not it was their original intent to spend years perfecting bream-fishing techniques and tackle, their advice—unlike most of the fishing hyperbole you hear around bait shops or read off the newsstand—is worthy of a serious listen.

Edenton's Jerry Stotesbury fits the profile. Owner of the town's key fishing center, Pembroke Creek Marina, he's been a bream specialist for 35 years. And he hasn't forgotten the most important thing—it's pure fun.

"Some fishing can be work," says Jerry. "Bass fishermen, for example, may cast 1,000 to 1,500 times in a day to hook two fish, and that's after several hours of preparation and travel. Besides, they're toting enough tackle to open a small bait shop.

"Bream fishing is nearly the complete opposite. It doesn't take a lot of tackle or time or travel. Here in North Carolina, with all its farm ponds, streams, and rivers, you don't have to go far on the road or water to have the best of it. All I need is a fly rod and two or three of my special bugs and I'm good to go."

For some fishermen, the words "fly rod" trigger a cold sweat, but they shouldn't. "Other tackle's fun and easy to use," Jerry says, "but a fly rod is the ultimate for bream because of its sensitivity and efficiency. After you master a few basic casting techniques, it's no more difficult to handle than anything else. Keep in mind that bream fishing, unlike stream fishing for trout, doesn't demand pinpoint presentation. If you can learn to lay out 15 to 20 feet of line, and put your enticement close to where you want it, you're in business."

All Jerry needs is a basic 8- to 8 1/2-foot light action fly rod. It doesn't have to be expensive but, as is true with most things in life and especially fishing tackle, the better the quality, the better it is likely to perform. Single-action reels are the norm for most fly-fishing situations, but for bream a simple automatic fly reel is easier and more efficient. You don't need a noisy clicker or drag like that found on the various single actions and, with one tap of your little finger, the automatic will zip up loose line that's inevitably destined to become a tangled mess in the boat or on the shoreline.

A simple, level floating line to match the weight of the rod will do the trick nicely. Expensive weight-forward or double-tapered lines simply aren't necessary. Nor is backing. It does make sense, however, to go with a

quality fly line because it requires less care, and will last longer.

Likewise, leaders don't need to be elaborate. A straight piece of monofilament, slightly shorter than the length of the rod, will do it. Jerry uses 4-pound test monofilament for clear water and calm conditions, 6-pound test when in modest structure, and 8-pound test where there's a better chance of fish tangling you up, or where you expect to run into bass. The number of bass, even lunker bass, that will attack tiny bream bugs is surprising. Because he uses a level leader, Jerry doesn't need a tippet.

What really matters is what's tied to the end of the leader, and here's where Jerry's expertise gets uncompromisingly specific.

"Fishermen immediately associate a fly rod with surface poppers," he says. "I'll be the first to agree that there's nothing more exciting than a fish crashing a top-water bug. You can't beat it because you can see it happen. But the problem with poppers is the very disturbance they're designed to create can also turn fish off, particularly when fish are bunched up or in a bedding situation. You may pick up four or five bream right away, but then the action will slow down considerably even though there are dozens of other fish clearly within view. For reliable, nonstop action you have to go subsurface."

Jerry has experimented with a variety of nymphs more commonly found in a trout fisherman's fly box. Most have produced fish, but the ant pattern has produced the most, by far. Yet he felt there was still something missing; something that would alter the ant's sink rate, add some bulk, and make the bream hold onto it a bit longer. That something turned out to be a tiny strip of pork rind. Tipping a wet fly, streamer or nymph with pork might cause a dyed-in-the-wool trout specialist to adopt an assumed identity. But bream are not salmonids, and they like pork. Maybe it's something cultural, but tipping a sinking fly with a bit of rind is deadly.

Jerry likes to use a size 8 Bett's ant. The hook on the size 10 is too small to carry the pork and give solid hook-ups, and a size 6 is simply too big except for the biggest bull bream. Most ants are black, and Jerry likes to tip his ants with white rind.

Uncle Josh Number 50 Bass Strips provide the raw material for the trailer. Other pork shapes will work, but these strips have just the right thickness and texture. With an Exacto blade or sharp knife, he cuts strips 1-inch to 1 ¼-inches long and ¼-inch wide, making them pointed at one end. At the opposite blunt end, he punches a tiny hole or slit with the tip of the blade to make it easier to slip it past the hook barb. Each bass strip will make 10 to 15 bream trailers. You can cut a jar full in an hour and, unless you're hopelessly careless, that should last a full season.

How, where and when the bait is fished are as basic as the bug and bacon combination itself. Jerry lets it sink slowly until it's 2 or 3 feet deep, then twitches it gently with the rod tip while stripping in line in 2- to 3-inch bits. The twitch-and-strip method keeps the bait at the correct depth, yet adds the necessary climb-and-drop action.

Bream love it like barbecue ribs at a free lunch, but rather than hammer it the way they do a floating bug, they simply suck it in. Frequently all you'll see is the line twitch. The bigger the bream, generally, the less noticeable the strike. Often they'll inhale it, never moving a fin, and you don't even know they're on until you strip in the next bit of line. Though only a bream could verify it, I'm certain it's the natural texture and feel of the pork that keeps them holding on. A hard strike can pull the ant out of their mouths, and you need only lift the rod tip to set the hook.

Depending on the weather, bream can be caught practically year-round in North Carolina. However, from March through the end of June, and again from mid-August through October, fishing is likely to be at its best. As with most species, early morning and late afternoon are prime times. That doesn't mean you should hang it up during the middle of the day, by any means, and particularly when bream are bedding.

The initial, and most productive, bedding period occurs with the first full moon in May. If you have any experience at all with bream, you will immediately recognize the minefield of scooped-out depressions in 2 to 4 feet of water in coves and flats—those are bream beds. Take note that it's standard procedure to fish the outside of these spawning areas first because most of the bigger bream will bed on the perimeter, particularly along the deeper edge, or alongside any irregularities that are present.

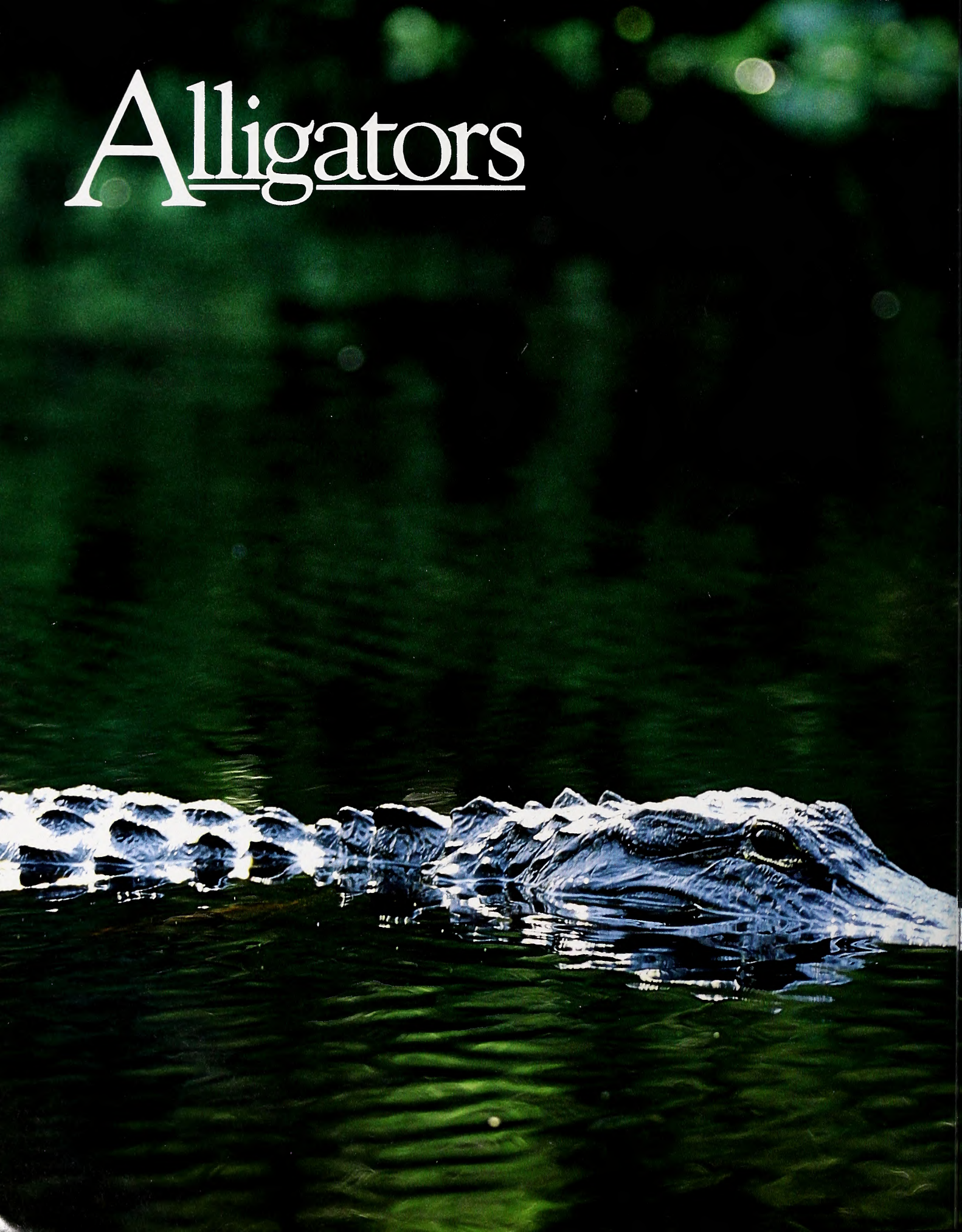
When bream aren't bedding, the key is to fish shallow-water structure and shade. "In the blackwaters of eastern North Carolina, show me a cypress tree or some overhanging bushes, and most of the time I'll show you a bream," says Jerry.

And, most of the time, his ant and pork combo will far outproduce anything else, especially any artificial. You can fish ultralight spinning tackle if that's what you prefer. But for pure fun and fast action, grab a fly rod and learn how well bugs, bacon and bream go together. ⊡

BARRY DAVIS

***A stringer of freshly caught** bluegills means a tasty supper is in the offing. The most satisfying way to capture the main course is by using a fly rod and an ant or popper tipped with pork.*

Alligators



How can tropical reptiles dating back to the dinosaurs survive in North Carolina? And are their closest kin today really flying to your bird feeder?

by David Lee © 1993

"Who was the first European to describe an alligator?" I always liked this question. It made students wade through their repertoire of historical knowledge and it offered a red herring that kept their minds out of ecological and geographical realms where the answer was readily available.

"Ponce de Leon?" The answer posed as a question was offered feebly to break the silence. "He certainly must have encountered alligators in his travels in Florida, but," I would add, "the first description was well before 1513." The responses eventually degenerated into a non-chronological list of Spanish explorers and the class would inevitably start evaluating answers. I would let this drag on for several minutes; it made the correct answer more dramatic.

The original description is dramatic, too, so I would read parts of it to the class, "...great serpents with feet," mouths "large enough to swallow a man whole...with great teeth. And in short they are so fierce-looking and so hideously ugly that every man and beast must stand in fear and trembling of them." Knowing full well that it provided not the slightest clue to the correct answer, I would pause.

"Give up? It's Marco Polo's description of the Chinese alligator in the late 1200s." The class knew it had been set up, but worse, that the lecture to follow would offer more information about alligators than any of them cared to know.

Like my students, most people assume that alligators and crocodiles are tropical and, for the most part, they are. There are two species of alligators and both are temperate counterparts of the 22 living species of crocodiles, caimans and gharials. How they manage to live in temperate climates on opposite sides of the world in latitudes where they must survive subfreezing temperatures is an ecological paradox. It seems preposterous that large, prehistoric reptiles with physiological programs set in Triassic swamps can survive a hard freeze.

Is it not suspected that changing climatic conditions led to the extinction of dinosaurs and other large reptiles? Indeed, the inability of alligators to hibernate should prevent them from colonizing the very areas in which they live, yet both the Chinese and American alligators are found in areas where ice and sometimes snow occur annually. That's certainly true in the northern parts of their native range in coastal North Carolina.

While low temperatures cause reduced blood-glucose levels and loss of appetite there is no seasonal change in metabolic rates in alligators. Unlike other temperate reptiles, alligators cannot simply burrow in the mud and exist on anaerobic respiration during the winter. They must breath air, and in ice-covered ponds this poses problems.

KEN TAYLOR

The sight of skulking *alligators has become more common in North Carolina waters as a result of protection granted under the Endangered Species Act. Alligators are occasionally found inland, but most populations in the state are in the southeastern Coastal Plain.*

Alligators

During approaching cold spells, alligators move to shallow areas, positioning their backs and tails in somewhat deeper and warmer water and their nostrils at the surface. It is essential for them to maintain a breathing hole. Sometimes the snout actually freezes into the ice, but the gators show no ill effects when the ice later thaws. Those unable to maintain breathing holes drown.

It's surprising that some of the metabolic features alligators inherited from tropical relatives are actually useful tools for surviving cold weather. A fuel-efficient metabolism ideal for periods of drought in the tropics also works well for winter dormancy. Being cold-blooded means that not only is the animal sluggish at low temperatures, but more important, it does not need to waste energy maintaining warm body temperatures. Somehow we have come to equate cold-blooded with an inferior ability to cope with the environment, but this is not true.

On sunny days the reptiles simply haul their bodies out on banks. Their dark scaly skin efficiently absorbs heat and their bulky mass stores it. Water stores heat, too, allowing the animals to maintain rather stable body temperatures with no effort. Because of this, alligators are able to convert about 60 percent of the energy obtained from food as fat. The fat is stored primarily in organs in the abdomen, along the back and in the tail. These fat reserves are more than ample to get the animal through the winter.

Alligators and other crocodilians also make efficient use of the food they consume, digesting bones, fish scales, turtle shells and feathers. They can, and do, eat just about anything because their stomachs are the most acidic of any vertebrate. The efficient use of both food and energy allows large individuals, under extreme circumstances, to go as much as two years between meals!

Even their hunting involves little expenditure of energy. Alligators like other crocodilians are sit-and-wait predators, using short, quick bursts of energy to grab prey. These bursts place abrupt oxygen demands on their circulatory systems. Thus these large reptiles are easily exhausted and must spend considerable time recovering from any activity. Yet their "laziness" and patience is a major factor allowing them to be successful outside the tropics.

While large prey species are the kills most often reported, crocodilians consume whatever is available. It is not unusual for even 10-foot gators to make a living on small fishes (70 percent of the diet in most areas), insects, shellfish, reptiles and birds. They can handle large mammalian prey, however, and animals drinking at shorelines are particularly vulnerable. Muzzles are seized in powerful jaws and gripped by the 60 or more sharp teeth. Large animals are flipped over with a powerful spin and held to the bottom

until they drown. Turtles are crushed in their shells and birds are plucked from branches and sometimes even from the air by gators that can vault vertically out of the water to heights of 5 feet and more, propelled by powerful tails. The crocodiles of Africa will kill prey as large as wildebeests, zebras and water buffalo. Their ability to dismember prey by shaking and twisting is legendary.

Alligators do not pose as great a threat to humans, although there have been many incidents, some fatal. There are reports of saltwater crocodiles learning to flip small boats for their contents, or eating a thousand or so Japanese soldiers in a single night in the mangrove swamps of Burma.

In 1969, alligators were protected to halt their rapid decline, and were later brought under the umbrella of the Endangered Species Act in 1973. Their numbers increased and gators became less wary of humans. There were as many as 14 attacks reported in Florida each year in the early 1970s with six known fatalities between 1973 and 1988. In the previous 25 years the total number of documented attacks in Florida was 10 with no known fatalities.

MELISSA McGAW

Alligators in many areas *eat mostly fish, but will kill and eat larger prey such as turtles, birds, raccoons and opossums. Larger mammals such as small deer or domestic dogs will also be eaten if the opportunity presents itself. Alligators usually ambush their prey by remaining motionless until the animal approaches, then swiftly attack with a short powerful lunge.*

Why the increase in attacks? There is no simple answer, but environmental education has made people more comfortable with gators—some are even feeding them. Some gators may have lost their fear of man. Also, human population growth and the increased use of aquatic habitats for recreational activities has put humans and gators together more often. Even so, the number of attacks is statistically quite small with all occurring in water, and most involving children and small adults.

Because their range extends so far north, alligators restrict their breeding and nesting activities to the warm summer months and have breeding seasons far shorter than their tropical counterparts. By March, the testes of the adult males begin to enlarge, and female reproductive hormones peak in early April. Yolk follicles grow and, by late May, just as the females ovulate, the male sperm output reaches its peak. In a given area, all the eggs are laid within a two-week period. Unlike other crocodilians, the entire population of adult female alligators does not reproduce in a given year. It would appear that the demands of getting through the winter combined with the short period for preparation hinder annual egg production.

Males grow faster than females and reach sexual maturity sooner. In the northern part of their range it may take twice the time to reach adulthood—15 to 18 years. Courtship extends through April and May, and is a protracted affair consisting of nudges and bumps. Three weeks after mating, eggs are deposited in a nest constructed of vegetation and dirt. The decaying nesting material elevates nest temperatures and speeds embryonic development. The females guard the nest for the 65-day incubation period, assist the young in emergence and guard them in nurseries for their first few months.

Nest temperatures are critical during the first half of incubation, and also determine the sex of young alligators. At temperatures between 86 and 90 degrees Fahrenheit, sex ratios of the 35 to 40 young are about evenly divided between males and females. Temperatures less than 86 degrees produce only females and those above 90 degrees, only males. Thus, it is not unusual for a particular nest to produce only males or females. Unusual weather in late June and

Alligators

KEN TAYLOR

***Like other cold-blooded** creatures, alligators depend on the warmth of the sun to heat their bodies. These reptiles are commonly seen basking on logs or on the open banks of ponds or rivers.*

early July could affect a whole season's production. In the Carolinas, it is possible to get sexually skewed populations composed of a large number of females.

At this northern edge of the alligator's range, the reptiles occur only in a narrow coastal area buffered from the harshness of winter by the warming influence of the sea. Here the gators must not only survive ice and an extremely condensed nesting season, they must also maintain high enough nest temperatures to ensure the production of some males. While this is a precarious situation, it is overcome by two factors that the alligator inherits from its tropical kin—longevity and patience.

Male gators may live for 50 years, being reproductively active for perhaps as many as 25 years. Thus nesting failures for several consecutive seasons or the absence of the production of hatchling males for a decade would not necessarily be a serious problem.

As a group, crocodilians are quite ancient. The oldest fossils date back 230 million years, placing the earliest crocodilians in a geologic period alongside the earliest dinosaurs. In fact one particularly large species, *Deinosuchus* (the terror crocodiles), had a length of about 36 feet and an estimated weight of six tons. Their fossils are always found in association with large plant-eating duck-billed dinosaurs, and it is assumed that *Deinosuchus* preyed on them. The species occurred throughout North America and disappeared in the late Cretaceous period about the same time as the dinosaurs. A number of fossil crocodilians have been found in North America, most presumably from times when climatic conditions were more tropical than they are today.

Fossil alligator-like crocodilians are known from North and South America as well as Europe and northern Asia. By the Miocene period (24 million years ago), alligators had vanished from all of the Old World except northern Asia, and they were never successful in invading the Old World tropics. While the early alligator-like fossils are from times and places that were lush and tropical, the more recent ones are from places like Nebraska. It would be logical to assume from the fossil evidence that the widespread alligator-like crocodilians disappeared from the tropics—the exception being the caimans of South America—possibly because they were unable to compete with the wide assemblage of crocodiles that evolved there, and they survived only to the north of these larger and more aggressive species just as they do today. Continental drift and a modest fossil record now make Marco Polo's discovery of alligators in the Yangtse River basin in China much easier to explain.

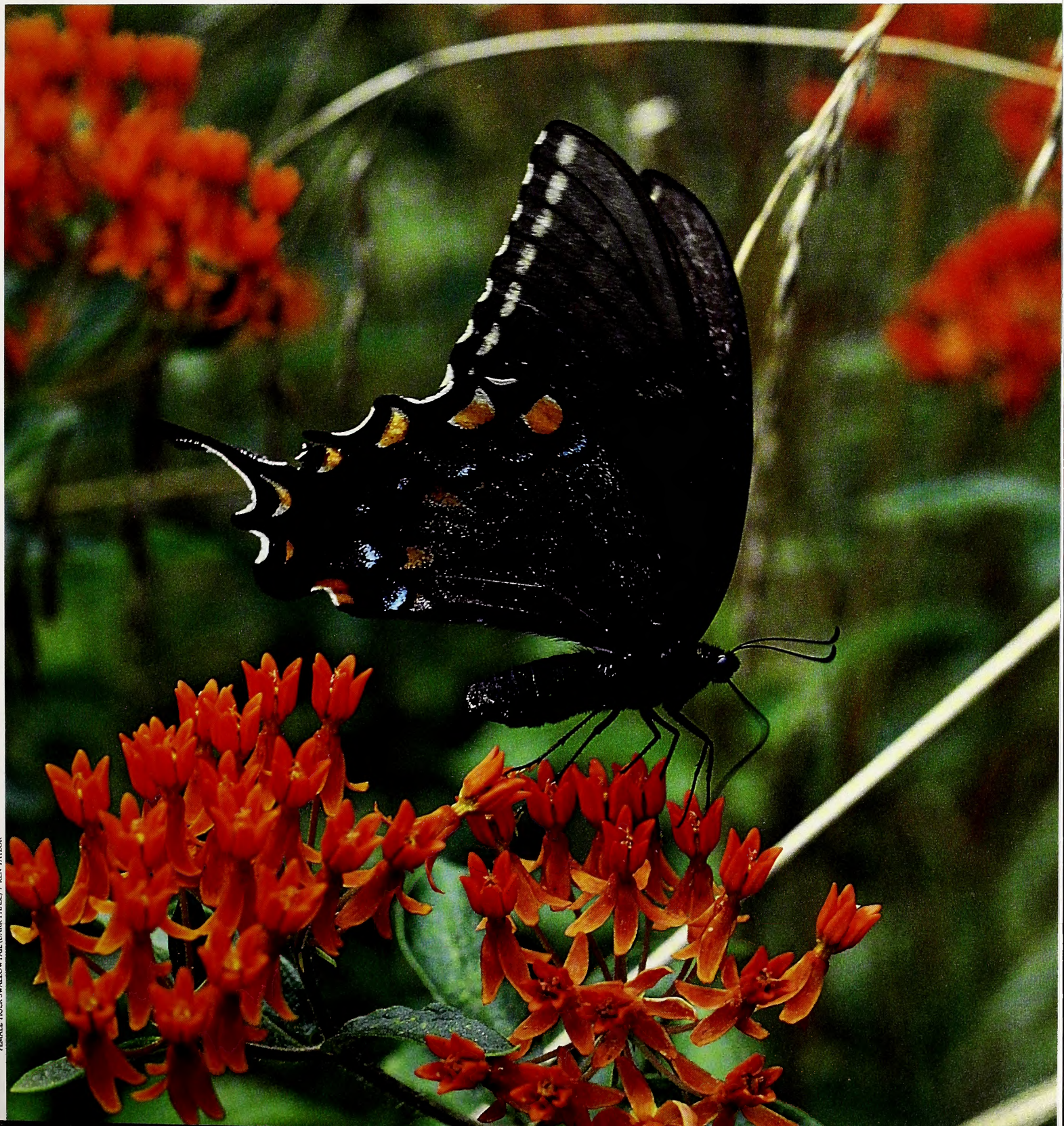
Alligators have many features that are quite peculiar. Some are the very pre-adaptations that might allow alligators to survive where common sense suggests they should not. Others show a family lineage placing them closer to dinosaurs or birds than to other living reptiles. Like birds, for example, alligators have extensive behavioral traits developed for maintenance of territories and family groups. The males have territorial songs—bellows—and the young have distress cries. Females not only build nests, but also incubate the eggs. They also protect the eggs and young. Young gators synchronize their hatching much like quail to assure they are all ready to leave the nest at the same time. The females assist the young in escaping from the eggs and will often carry them in their mouths to protected coves where they can oversee early growth.

Alligators and other crocodilians have many anatomical similarities to birds, but most unexpected is their four-chambered heart, typical of birds and mammals and unlike the three-chambered heart of reptiles. Of course, alligators have scales and teeth, and are cold-blooded, but birds have scales on their legs and feet and feathers are nothing more than modified scales. Furthermore, several extinct orders of primitive birds had teeth. The point is that even though in external features alligators and lizards appear to be similar, they are not, and while modern birds look quite unlike alligators and perform feats like flying, they share a common ancestry.

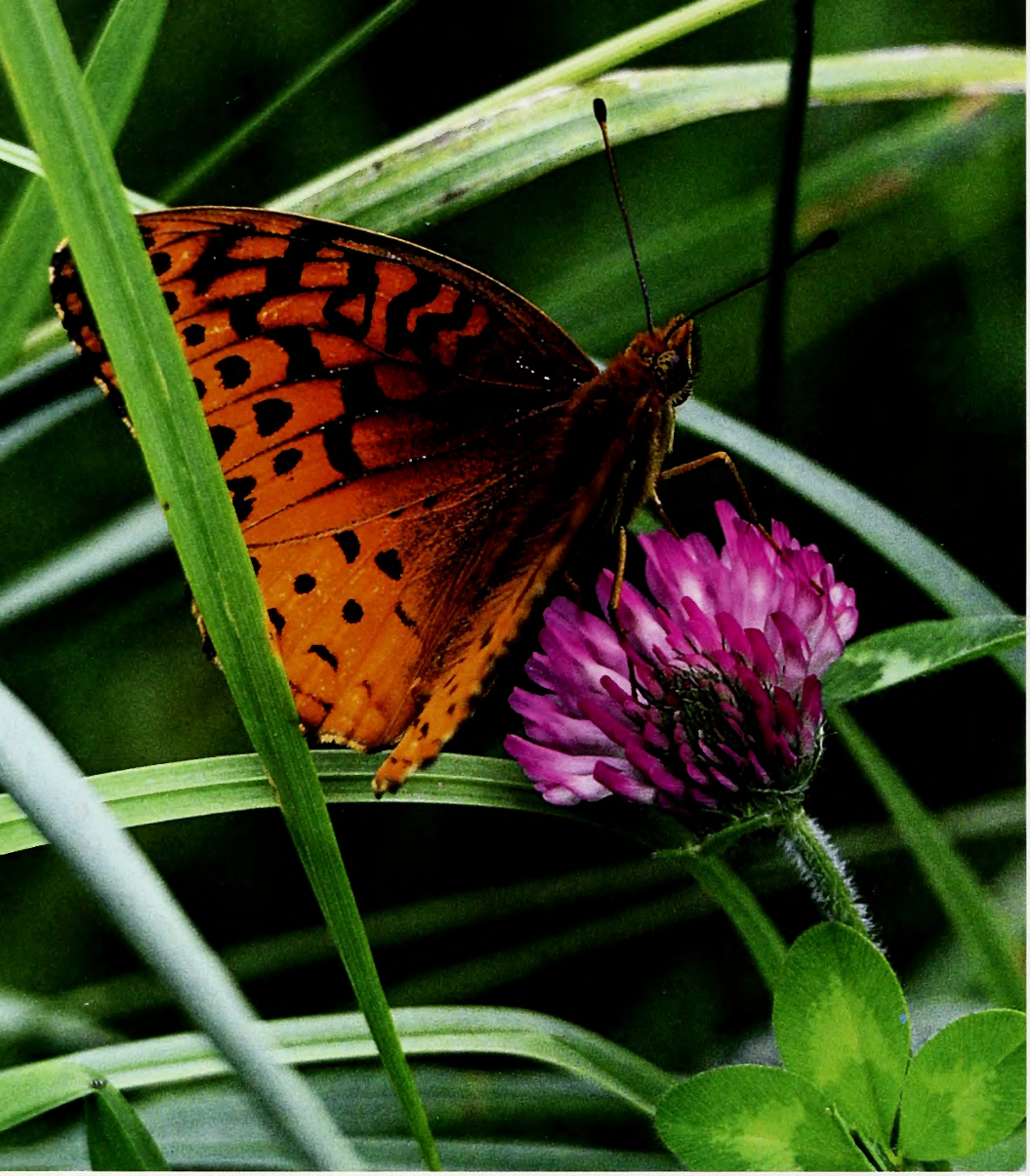
I think Audubon Society members should include alligators in their bird counts, but to date I have been unsuccessful in getting this practice adopted. Maybe some of my classes —suitably informed about alligator ancestry—will someday become Audubon members and make my dream a reality. ⊠

GARDENS *for* BUTTERFLIES

If you plant it, they will come. Butterflies, that is. Here's how you can grow a magical garden that will attract nature's most colorful creatures.



FEMALE TIGER SWALLOWTAIL (DARK PHASE) / KEN TAYLOR



KEN TAYLOR

KEN TAYLOR

by Kim Hawks © 1993

There is probably no more magical creature than a butterfly. Before written history, in the time of legend, a butterfly was often seen as a metaphor for the soul. Indeed, butterflies are like extensions of the flowers themselves, as well as being light and carefree spirits in the garden. Given the right conditions, they grace our gardens for six to eight months of the year and then fly away. Perhaps this independence is partly what makes butterflies so appealing. While we can't confine them to our gardens, we can lure them there with careful planning.

I stumbled onto my interest in butterflies enroute to starting a wildflower nursery. In the early years of Niche Gardens, I propagated plants madly, working to offer native plants to gardeners throughout North Carolina and the southeastern United States. After a couple of years of building up our stock and selection of plants, we began incorporating these plants in display gardens. Soon, butterflies began to appear. Dozens of tiger swallowtails hovered around the joe-pye weed and flurries of monarch butterflies sipped the nectar of the vibrant orange flowers of butterfly weed. I quickly became hooked on butterflies and began gardening in ways to attract these lovely creatures.

You can, too. Your yard has the potential to become a safe haven as well as a functioning ecosystem for butterflies and other wild creatures. Whether you have several acres or room for only a few containers on your porch, you can attract butterflies if you are aware of some of their basic needs.

Sunlight. Butterflies thrive in sunny areas. These cold-blooded creatures need sunlight to warm the muscles they use to fly. While you may attract some butterflies in shady gardens, the numbers will increase dramatically if you can create a sunny garden somewhere on your property. Open, undisturbed areas visible from your kitchen, living room, family room or patio are ideal.

Protection. Of the two most serious threats to butterflies—wind and predators—you can't do much about predators. You'll find that as you create favorable spaces for butterflies, more birds (predators) will appear. Accept them and welcome all creatures into the garden whether they are predator or prey; you'll be richer for them. However, you can

***The Aphrodite fritillary** (top) is attracted to clover and other nectar-producing plants. Adults appear in summer mostly in the mountains. This light-phase female tiger swallowtail (bottom) rests on a milkweed plant.*

protect butterflies from prevalent summer winds by installing wind breaks of shrubs and trees, vine-covered trellises, fences or attractive garden walls.

Mud puddles. Mud puddles are to butterflies what birdbaths are to birds. While butterflies do not drink from open water, males especially tend to congregate around mud puddles and damp places. They drink salts found in mud, and "mud drinking" in groups is thought to be associated with mating or is perhaps a territorial behavior. At any rate, don't be obsessed with filling in all the natural depressions in your yard as these periodically provide muddy water for adult butterflies. You may want to add a few rocks in deeper depressions for the butterflies to bask and perch on. You can create puddles by sinking a container without drainage holes in the ground, filling it with a sand and soil mixture, and adding water.

Variety of habitats. Butterflies naturally flock to open, dry meadows as well as sunny, boggy areas. Areas you have no control over may actually encourage more butterflies to your gardens. For example, a power line borders our property on the south side. The power company keeps this sunny, wet area clear of trees allowing members of the milkweed family to thrive. Milkweed is the favorite food of monarch butterflies. A dry, sunny field across the street also attracts other species of butterflies. While I do not own these areas, they increase the probability that more species of butterflies will visit my land, as long as I also provide them what they need. In residential neighborhoods, more butterflies will visit your garden if you encourage your neighbors to garden for butterflies.

Food. Food is a necessity for butterflies as it is for all creatures. You need to provide food for two stages in a butterfly's life cycle: the larval and the adult stages. While some nonnative plants provide food during these stages, native plants tend to attract butterflies in great numbers. One reason is that most native species have single flower petals that provide an easier landing pad and foothold for butterflies than the frilly, double petals of many hybrids and cultivars. Native plants also tend to be richer in nectar than hybrids or cultivars.

Nectar, of course, is what draws most butterflies. Nectar provides carbohydrates to aid the adults in their energy-consuming flight. It's an aqueous solution of three types of sugar: sucrose, fructose and glucose. Some butterfly species are very particular about their diet and will only sip the nectar from specific plants. For example, monarch butterflies prefer the nectar found in members of the milkweed family, such as butterfly weed (*Asclepias tuberosa*) and swamp milkweed (*Asclepias incarnata*). Tiger swallowtails, on the other hand, are not as particular and can be found nectaring on several kinds of plants, such as joe pye weed (*Eupatorium fistulosum*), coneflowers (*Echinacea purpurea*), and members of the goldenrod family (*Solidago spp*).

Butterflies favor a large number of nectar-producing plants and a diversity of species. Butterflies appear to sense the most prevalent nectar source in the area and will concentrate on those plants. Therefore, plant drifts, masses or sweeps of each flower if possible. A minimum of five or 10 plants of each species will encourage more butterflies.

A diversity of nectar-producing plants is important as well. Butterflies are first attracted to flowers by their color and then by their shape. Although opinions may vary somewhat, preferred flower colors are yellow, purple, red and orange. Make sure that you've got flowers blooming all season long. Many times our gardens are full of flowers in the spring and then transform to a quiet mass of green with an occasional splash of color from annuals summer through fall. In North Carolina, we are blessed with a long growing season that allows a diversity of hardy plants to be incorporated into our gardens to

continued on page 18

DAVID LIEBMAN

***Red spotted purple butterflies** can be attracted to apple, quince or wild cherry trees in the garden.*

Butterfly Life-Cycles Determine Plant Choices

A well-planned butterfly garden provides more than just plants that produce nectar or decaying fruit to attract adult butterflies. It should also provide places for the butterflies to lay eggs, food for the larval (caterpillar) stage and places for the pupae to attach. In other words, if you want a truly attractive habitat for these handsome creatures, you need to plan for all four stages in a butterfly's life cycle. Here are some examples to help you get started; however, you'll need to consult more detailed references to learn native plant preferences during all the life cycles of the many butterfly species.

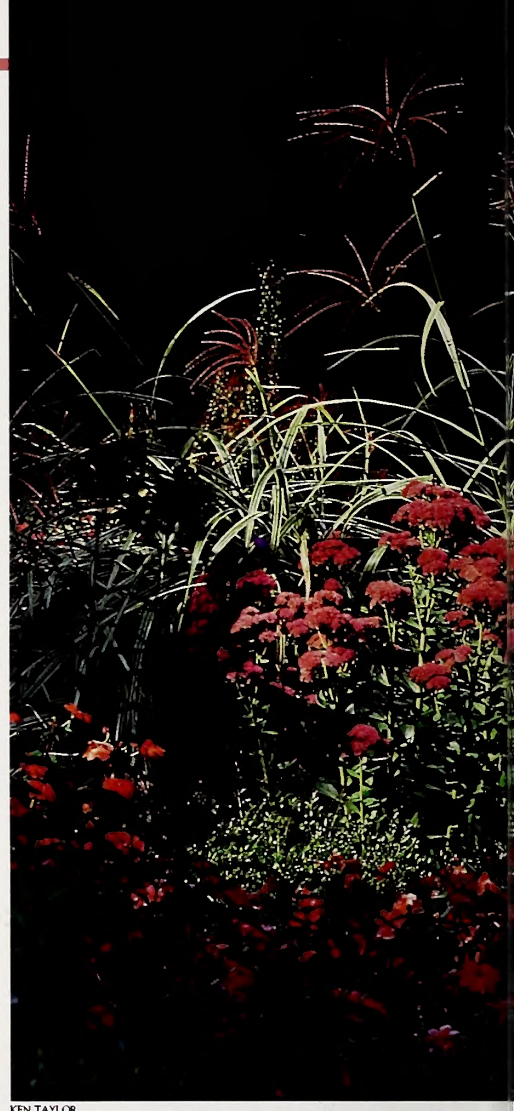
Butterflies lay tiny eggs, and some attach them to very specific plants. The gulf fritillary prefers to lay eggs on native passion vine foliage (*Passiflora incarnata*), while the Monarch butterfly prefers members of the milkweed family. Some eggs lie dormant until spring while others hatch before winter arrives. Most, however, hatch in the summer within two weeks of being laid.

When the eggs hatch, the larvae or caterpillars need lots of food for periods of three to six weeks, sometimes very specific kinds of food. Spicebush swallowtail caterpillars, for example, prefer sassafrass and spicebush. Native plants in the rudbeckia or black-eyed Susan families provide food for a wide variety of butterfly larvae, as do many native sunflowers and native grasses. Sweet pepperbush (*Clethra alnifolia*) provides food not only for some larvae, but also adult butterflies. Butterflies are very sensitive to pesticides, so instead of using them, simply provide more plants favored by the larvae.

After a series of molts while growing, the caterpillars transform into a pupa or chrysalis. Though they do not eat foliage while in this sedentary form, the caterpillars attach their chrysalis to plants. Some species spend the winter this way, while others emerge in 7 to 14 days as an adult butterfly. Many adult butterflies typically live 35 to 40 days, but this varies depending on the species, and the average adult may live only 10 to 12 days as a result of predation and other forms of mortality. It is, of course, this adult phase that bedazzles our gardens with dancing color.

***Great spangled** fritillary on clover.*

KEN TAYLOR



KEN TAYLOR

Some Garden Butterflies

FAMILY	FLIGHT PERIOD	ABUNDANCE	MAIN FOOD	LARVAL HOST
Swallowtails				
Tiger	Spring, Summer	abundant	nectar	Cherry, Tulip poplar
Black	Spring, Summer	common	nectar	Parsley family
Spicebush	Spring, Fall	abundant	nectar	Spicebush
Zebra	Spring, Summer	uncommon	nectar	Pawpaw
Pipevine	Summer	uncommon	nectar	Pipevine
Sulphurs				
Cabbage	Spring, Summer, Fall	common	nectar	Mustards
Orange Sulphur	Spring, Fall	common	nectar	Clover
Cloudless Sulphur	Fall	uncommon	nectar	Partridge Pea
Brush-footed				
Mourning Cloak	Spring, Fall	common	fruit	Elm, Willow
Red Admiral	Spring, Fall	common	fruit	Nettles
Red Spotted Purple	Spring, Summer, Fall	abundant	fruit	Cherry
American Painted Lady	Summer	common	nectar	Everlasting
Viceroy	Summer, Fall	uncommon	nectar	Willow
Blues and Hairstreaks				
Eastern Tailed Blue	Spring, Summer	abundant	nectar	Legumes
Gray Hairstreak	Spring, Summer	common	nectar	Legumes
Skippers				
Silver-spotted Skipper	Spring, Summer	abundant	nectar	Black locust
Hoary Edge	Summer	uncommon	nectar	Legumes
Milkweed				
Monarch	Summer, Fall	common	nectar	Milkweed

SOURCE: CAMP DURANT NATURE PARK, RALEIGH.

ILLUSTRATED BY KIMBERLY K. CHEEK

A successful butterfly garden takes a bit of planning, but the results can be both beautiful to the eye and attractive to a wide range of butterflies. This sun-lit garden (left) is arranged with taller plants in the rear and it contains a variety of plants (listed below) specifically chosen to appeal to butterflies. Many other plants also attract butterflies.

1. *Impatiens*
   Impatiens sp.
2. *Live forever*
   Sedum sp.
3. *Blazing star*
   Liatris spicata
4. *"Silberfeder"*
   (ornamental grass)
   Miscanthus sp.
5. *Cardinal flower*
   Lobelia cardinalis
6. *Globe amarynth*
   Gomphrena globosa

provide flowers and nectar from early spring until frost.

In short, if you wish to attract butterflies to your garden, provide a diverse selection of plants that bloom spring through fall. Plant your butterfly garden in a sunny location with some protection from wind and allow some puddling to occur.

What kinds of plants attract butterflies best? There are many native herbaceous plants that lure butterflies to their sweet nectar. In the process of nectaring, many plants may also be pollinated.

Some of the first butterflies of the season can be seen nectaring on the bright blue flowers of Stokes' aster (*Stokesia laevis*). Flowers appear in early summer (June in Chapel Hill), atop 2-foot plants and make a lovely native trio along with butterfly weed (*Asclepias tuberosa*) and "Moonbeam" coreopsis (*Coreopsis verticillata 'Moonbeam'*).

Butterflies flock to the many species of native aster that inhabit sunny roadsides summer through fall. Several specialty nurseries propagate some of the native asters and they are worth seeking out. I especially like a dwarf selection of New England aster called "Purple Dome." It was discovered in a wild population in northeast Pennsylvania and has recently been propagated and released through some nurseries. "Purple Dome" is smothered with rich purple flowers on compact, bushy stems of 18 inches to 24 inches. It makes especially pleasing company when planted in drifts with *Solidago sphacelata* "Golden Fleece," a compact 2-foot goldenrod that blooms at the same time as "Purple Dome." "Golden Fleece" has a pyramidal form and its flowers radiate from fountain-like foliage. Additionally, I like its winter skeleton and do not cut it back until late winter.

Butterflies are also attracted to the golden flower wands of goldenrods. Although this plant is neglected in American gardens, Europeans have been planting our native goldenrods for over 100 years. Unfortunately, many people believe that goldenrod causes hay fever. The confusion lies in the fact that the real culprit, ragweed, is nondescript, but it blooms at the same time as our lovely goldenrods. Goldenrod flower forms include graceful elm-branched plumes, golden spikes, slender wands and flat-topped corymbs. Some species spread by stolons and are somewhat aggressive. These species are better suited to meadow areas.

However, there are several species that are very garden-worthy. In the 4-foot to 5-foot range, I highly recommend the bold, elegant *Solidago rugosa* or rough-stemmed goldenrod. Arching sprays of electric yellow flowers appear on urn-shaped plants in late summer. Ken Moore, assistant director of the N.C. Botanical Garden in Chapel Hill, N.C., discovered a more compact version (3 feet to 4 feet) that was rescued from an area destined to become a parking lot and relocated to the wet savanna habitat at the Botanical Garden. Ken watched this special goldenrod very closely and now, 20 years after its discovery, it is available to the gardening public. Ken named it *Solidago rugosa* "Fireworks," which refers to the electric golden yellow flower stalks. Flowering is very profuse and the form is somewhat cascading. The foliage is compact, which gives the entire plant a lacy texture. My favorite dwarf selection of goldenrod is "Golden Fleece."

Monarda species such as bee balm (*Monarda didyma*) and wild bergamot (*Monarda fistulosa*) are both showy, summer-blooming natives that provide nectar for butterflies. Bee balm is characterized by rich red tiers of flowers atop 4-foot stems and it inhabits moist areas in sun or dappled shade. Hummingbirds are also attracted to the brilliant red flowers. Plant monardas in areas with good air flow as they are susceptible to powdery mildew. Wild bergamot prefers drier locations and bears dense flower heads of lilac. There is a selection named "Claire Grace" that was discovered in the deep Southern town of Tylertown, Miss., that shows good resistance to powdery mildew.

By planting several different species of rudbeckias, you can have black-eyed Susans blooming from summer until frost accompanied by butterflies. Most species are perennial or, if short-lived, will usually reseed and reappear the following year. Give rudbeckias a sunny position and sit back and enjoy the flowers and butterflies.

Florists are familiar with the lavender spikes of blazing star (liatris), but many people are not aware that there are species native to North Carolina. These drought-tolerant

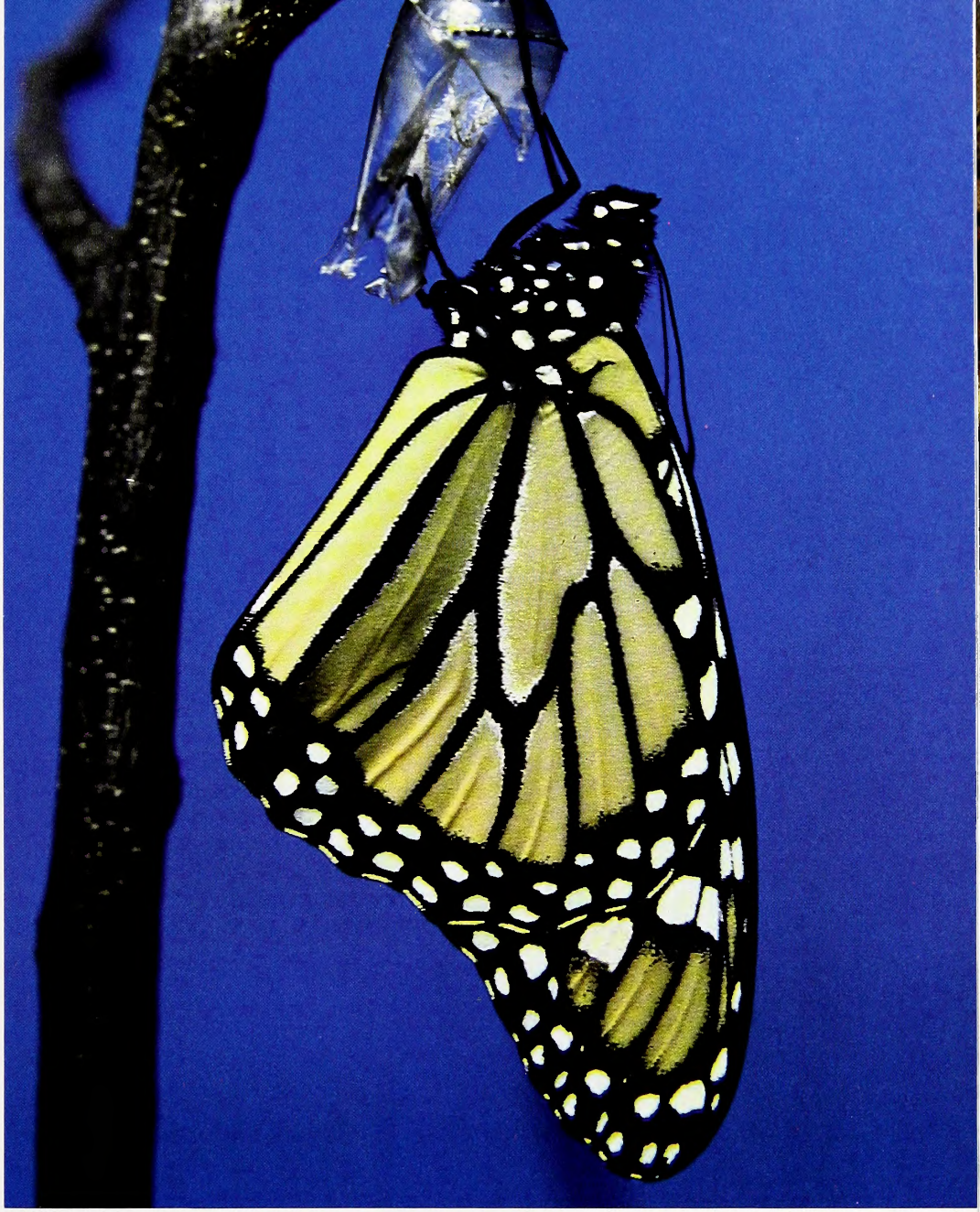
***Cloudless giant sulphur** is abundant in the Coastal Plain. Butterflies are attracted first by color and then shape. Favorite flower colors are yellow, purple, red and orange.*

DAVID LIEBMAN

natives grace our roadsides in late summer with prominent purple exclamation points standing 3 feet to 4 feet tall. Two species I especially like are gay-feather (*Liatris spicata*) with dense heads packed with numerous spidery flowers and Earl's blazing star (*Liatris earlei*) which has fewer flowers, but each flower is slightly larger and has more detail than the flowers of *Liatris spicata*. Although liatris are 3 feet to 4 feet tall, they are narrow in stature and do not appear "heavy" in the garden. The effect is as a "pop-up" or "see-through" vertical plant. Unlike other flowers, blossoms open first at the top and proceed downward. This flowering pattern makes liatris an excellent cut flower because the top of the flower spike can be cut to bring inside as the lower flowers continue to open in the garden. The flowers blend well with other summer-blooming natives such as goldenrods and rudbeckias.

Boltonia asteroides "Snowbank" is covered with masses of white daisy blooms on 4-foot to 5-foot plants in midsummer. Stunning in bloom, boltonia is very effective as a backdrop for other plants or in the center of sunny island beds. There is also a warm pink flowering selection called "Pink Beauty."

Monarch butterflies are guaranteed to visit your gardens if you'll plant members of the milkweed family as it is the preferred food of both the larval and adult stages. Butterfly weed (*Asclepias tuberosa*) stands 4 feet tall and is topped with vivid orange flower clusters



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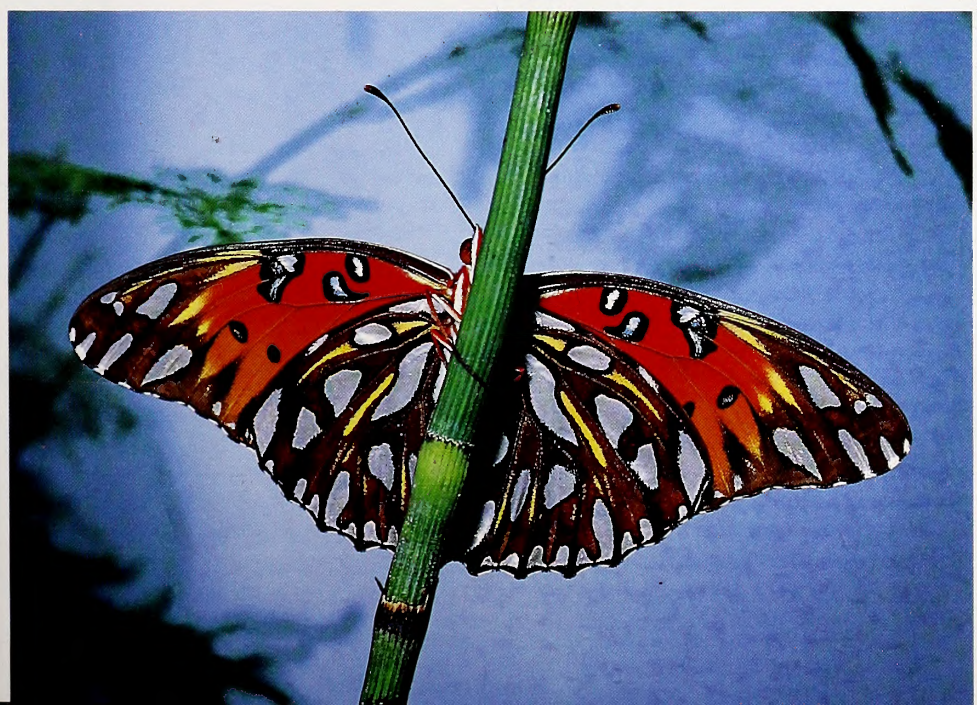

DAVID LIEBMAN

KEN TAYLOR

***Monarch butterfly dries** its wings after emerging from its chrysalis (top). Gulf fritillary (below) sits on a flower stalk. Eastern tailed blue (right), resting on a blade of grass, is common statewide.*

in early to midsummer. If you "deadhead" or remove the faded blooms after they flower, the plant will rebloom in early fall. This is an excellent choice for dry rocky areas. On the other hand, swamp milkweed (*Asclepias incarnata*) likes to stand in water periodically. It bears small clusters of bicolored pink and white flowers during midsummer and stands 4 feet to 5 feet tall. Plant it at the rear of the garden in a sunny moist location or along the edge of a pond.

Native phloxes also attract butterflies to their nectar. Two species I especially like are *Phlox paniculata* and *Phlox carolina* with warm pink, lightly fragrant flowers. *Phlox paniculata* "David" is a mildew-resistant selection that bears pure white flowers atop leafy stems that are 3-feet to 4-feet tall. Phloxes prosper in sunny positions with soil that has been enriched with organic matter.

All gardens need a spot of butter daisies to provide various shades of yellow blossoms. You can have coreopsis blooming in the garden almost all summer if you plant different species. They are easy to grow in sunny, well-drained areas and provide good fillers in flower bouquets. In addition to luring butterflies to your gardens, goldfinches are also attracted to the seeds.

I can't say enough about members of the echinacea genus. They are a passion of mine. Vibrant flowers, showy cones, a long season of bloom, drought tolerance, great cut flowers and the promise of tiger swallowtail butterflies all add up to very special plants. The bright flexed hot pink flowers of purple coneflower (*Echinacea purpurea*) make a stunning combination with butterfly weed in the foreground. The vibrant orange flowers of butterfly weed (*Asclepias tuberosa*) echo the prominent glowing orange central cone of purple coneflower. Plant coneflowers in sunny locations for several weeks of summer bloom.

Joe-pye weed (*Eupatorium fistulosum*) also attracts lots of tiger swallowtail butterflies along with several other butterfly species. It's hard for some people to appreciate a plant or give it a fair chance when it has the word weed in its common name, but I assure you, joe-pye weed is anything but a weed. Large billowy terminal inflorescences of numerous pale pinkish-mauve florets appear mid- to late summer. Wet or moist locations in full sun are best, but they also tolerate light shade.

A native trio I like includes joe-pye weed in the company of goldenrods and boltonias. Joe-pye weed towers to 7 feet or more and creates a huge rounded form that is sure to catch your eye and it is often covered with butterflies. Native sunflowers also draw butterflies to their golden yellow flowers in late summer and early fall. You can have sunflowers blooming in your garden as late as October by planting swamp sunflower (*Helianthus simulans*, formerly *Helianthus angustifolia*). Abundant golden yellow flowers literally cover the upper third of the 8-foot to 10-foot stems.

Ironweed (*Vernonia spp.*) colors roadsides in the fall with intense purple blooms on 6-foot to 8-foot plants. The butterflies called "American painted ladies" are especially attracted to its nectar. This drought-tolerant, robust native is showy on its own or in company with goldenrods and sunflowers.

Hopefully, these ideas will get you started in creating not only beautiful gardens, but a functional ecosystem that will provide a safe and welcome home for butterflies.

Kim Hawks is the owner of Niche Gardens, a retail mail order nursery in Chapel Hill specializing in southeastern native plants, as well as selected garden perennials, grasses and underutilized trees and shrubs.

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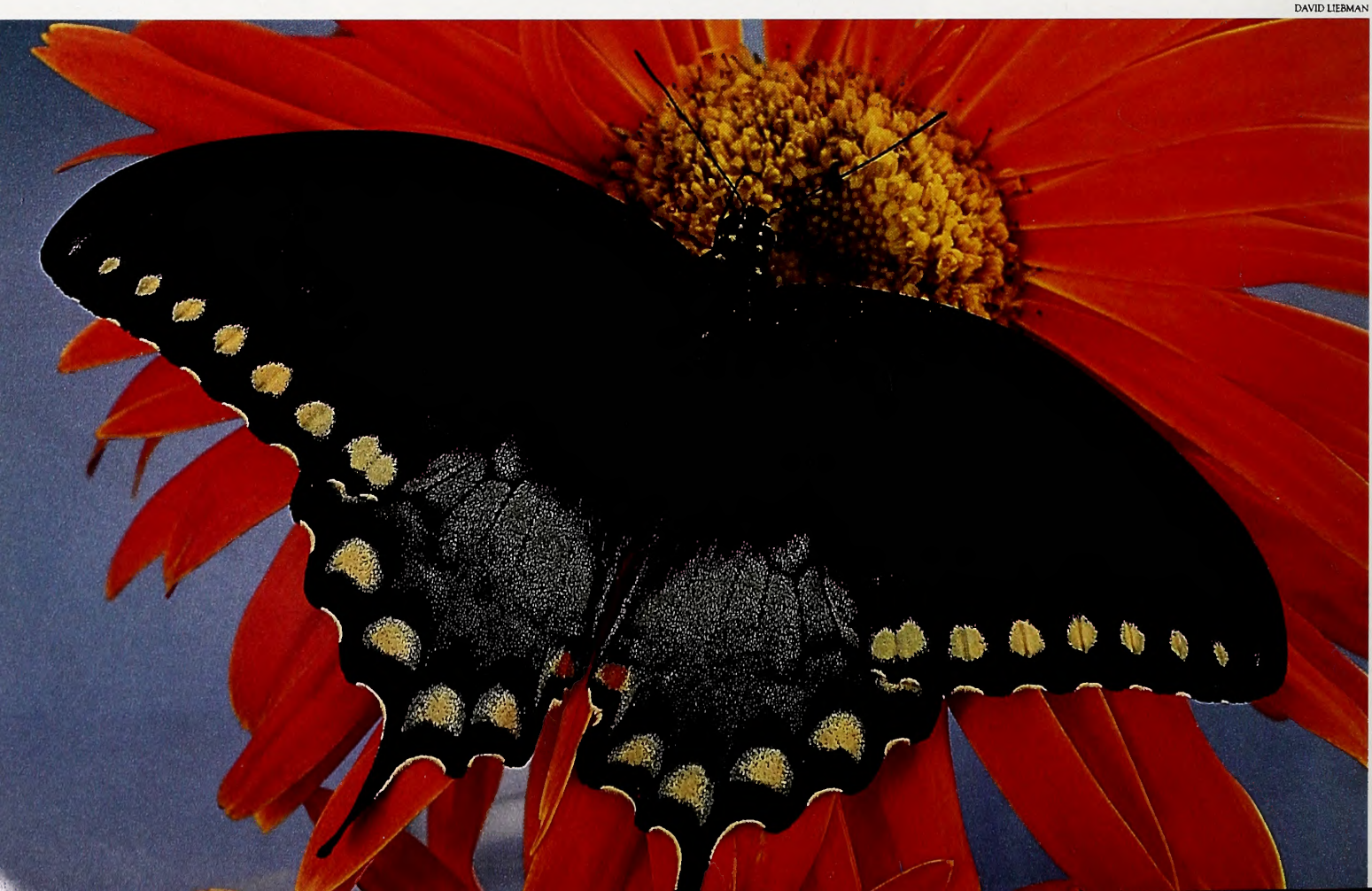
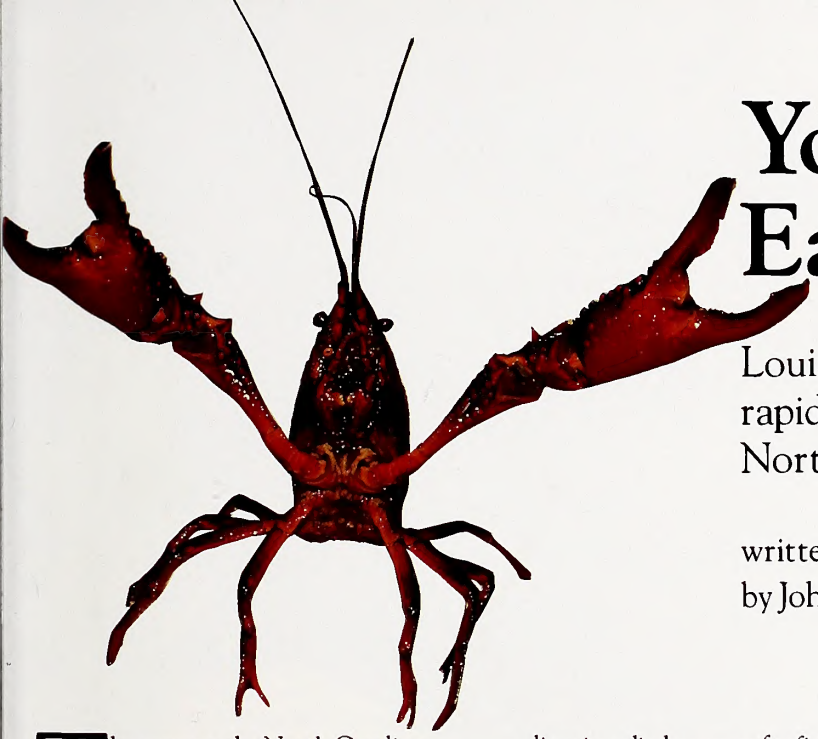


***Orange blossom provides** a colorful feeding perch for this spicebush swallowtail butterfly. The adult spicebush appears in spring.*



You've Never Eaten a Crawfish?

Louisiana's favorite Cajun crustacean is rapidly gaining popularity as a home-grown North Carolina delicacy.

written and photographed
by John Manuel © 1993

The scene at the North Carolina Farmer's Market in Raleigh was just shy of mayhem. Within a U-shaped perimeter of wooden tables, a dozen figures worked frantically with heads bowed. Jack Craven, a crawfish grower from High Point, watched over three 20-gallon pots steaming atop gas burners. As each pot reached a boil, Craven called to Coy Domecq of Chowan Aquaculture for a bag of crawfish. Domecq, resplendent in a crawfish-shaped headdress, hustled to the back of an open trailer and emerged bag in hand. Craven dumped the olive-colored crawfish into a wire cooking basket, submerged them in one of the pots, and pulled them out 10 minutes later a fire-engine red.

The cooked crawfish were dumped in a cooler, where Steve Gabel of the N.C. Cooperative Extension Service sprinkled them with seasoning. Don Young, seafood marketing specialist with the N.C. Department of Agriculture, grabbed handfuls of crawfish from the cooler and put them into Styrofoam trays. Weighing each tray on a scale, Connie Young-Dubovsky of the Cooperative Extension Service collected $4 from waiting customers and handed them a tray. The line stretched half the length of the building with several hundred waiting either for their first taste of crawfish, or to renew an old love affair in an unlikely place.

The annual Crawfish Boil at the North Carolina Farmers Market ended with dozens of customers still waiting in line. "In an hour-and-a-half, we sold 2,100 pounds of crawfish," said an exhausted Gabel. "That's all we had. We could easily have sold half again as much if we could have gotten them."

For most North Carolinians, a crawfish (also spelled crayfish) is a lowly critter that lives in a ditch—great for fish bait, but not for human consumption. But in Louisiana and other Deep South states, crawfish is a staple part of many people's diet. There, crawfish are consumed much as shrimp or crab are in North Carolina, and have long been associated with the unique Cajun culture of Louisiana. People gather together for "boils," steaming live crawfish in huge pots and eating massive piles of them. Many colorful and delicious regional recipes rely on crawfish: etouffee, gumbos, bisques and others. Almost everyone who eats crawfish understands their fanatical following, and quickly ranks them near the top of the flavor heap.

So what do they taste like? Some would describe them as being very much like shrimp, but perhaps with a sweeter, more lobster-like flavor. Crawfish meat not only is flavorful and firm, it is more nutritional than shrimp, and is high in protein and low in fat. Crawfish is also an excellent source of phosphorous, iron, calcium and B-vitamins.

Traditionally harvested in the wild, most of the crawfish consumed in the Deep South are now raised in commercial farms. Louisiana alone has over 125,000 acres under cultivation. Texas has about 5,000 acres and Florida 2,500 acres.

In recent years, North Carolinians have also been getting into the crawfish business. Gabel, considered the local expert in crawfish farming, counts about 18 growers in the state, with more being added each year. He is encouraging more North Carolinians to look into crawfish farming to help diversify farm income. "Right now, the demand for crawfish in this state far exceeds the supply," Gabel says. "North Carolina's market is small, but growing fast. The people who are in the business

The red swamp crawfish (top) *can reach a length of 9 inches and is the most popular species for commercial operations here and in the deep south. Crawfish boils are a wonderful tradition. Sterling Davenport boiled these at the Farmer's Market in Raleigh (above).*

now are doing great."

The first crawfish farm in North Carolina opened five years ago in Hyde County. Most operations are located in the eastern part of the state, but can be found as far west as High Point. Virtually all the growers are in it part time. "That's one of the beauties of the business," Gabel says. "It doesn't require a whole lot of effort, except during harvest time."

The crawfish most commonly used in commercial farming operations is the red swamp crawfish (*Procambarus clarkii*), native to Louisiana. Gabel says any of the several dozen crawfish native to North Carolina could theoretically be raised for food, but many are small and they have not been studied for aquaculture as the red swamp crawfish has.

The red swamp crawfish is a prolific and hardy species that reaches an edible size of 3 to 4 inches in two to six months. Fully mature adults can reach a weight of one-third pound and a length from tail to claw of nearly 9 inches, though most that are eaten are much smaller. Juveniles are greenish or brownish with faint brownish stripes on the tail. Adults turn a characteristic dark red on the sides and black on the back. When cooked, they turn a brighter red very much the same as a steamed hard crab. When their tails are removed and the shell is peeled, the average-sized tail will yield a piece of handsome white meat roughly the same size and shape of a shrimp.

Much of the crawfish's life is spent in or near freshwater. Thus, one of the prerequisites for getting into crawfish farming is flat land on which to build a pond. Gabel has seen crawfish ponds as small as one-half acre, although the average in this state is closer to five acres. Clay soil is the preferred substrate, both for its ability to hold water and for the structural integrity it gives to the tunnels in which crawfish live. Sandy or peaty soils are generally not good for crawfish farming.

Ponds are built with 3-foot high perimeter levees capable of holding 18 to 22 inches of water. Deeper water isn't necessary, and could support fish that feed on crawfish. The land slope should not be greater than 6 inches from levee to levee, otherwise the pond should be cut into several ponds with cross levees. An abundant supply of fresh water (60-70 gallons per minute per acre) is another prerequisite for crawfish farming. Crawfish ponds must be capable of being filled within a few days and replenished with water during dry periods. Crawfish are relatively tolerant of poor water quality, but they must have a moderate level of dissolved oxygen (two parts per million) and relatively hard water (a pH of around 7) to allow their shells to regenerate after molting.

***Red swamp crawfish** meets a potential, if somewhat wary, consumer. Crawfish have long been a staple food in many deep south states, and they are particularly associated with the lively Cajun culture in Louisiana.*

Well water can be used to supply crawfish ponds, but it may have to be treated to remove iron and hydrogen sulfides, and must be aerated to add oxygen. Of course, well water can be expensive to pump from any great depth. For larger ponds, surface water is preferred as it can be economically pumped with low-lift pumps. The major concern with surface water is that it be kept free of pesticides. Crawfish are closely related to insects, and pesticides will quickly kill them.

In areas where the water table is high, farmers often dig a moat around the perimeter of the pond and and use the water that flows in to replenish the pond. Soil excavated from the moat is used to build the levee.

Typically, a crawfish operation is begun by building a pond during the winter or early spring and filling it with 12 inches of water. A drain is installed to allow water levels to be controlled. The drain may be as simple as a length of 6-inch flexible pipe run horizontally through the levee at the low end of the pond. The protruding end of the pipe can be raised and lowered by hand to adjust the water levels.

In April or May, crawfish are shipped in from Louisiana and stocked at the rate of 50 to 100 pounds per acre. Gabel recommends stocking an equal ratio of males to females. Crawfish mate in open water—each male inseminating as many as four females. Interestingly, the female can store the sperm in a seminal receptacle for two to eight months, waiting until conditions are favorable before she decides to inseminate her eggs.

After mating, the female burrows into the levee about 4 inches above the water level. (Levees must be at least 6 feet wide at the base to prevent crawfish from burrowing through.) The female seeks out a depression and works her way in backwards, pushing mud outward with her claws. Inside the burrows, females lay small, dark brown eggs, that become attached to the feathery appendages beneath the tail. The eggs are incubated for several weeks, after which the young hatch out and remain with the mother in the tunnel.

In June or July, farmers begin draining their ponds at the rate of about 1 inch per day to stimulate burrowing and reproductive activities of the remaining crawfish. Once the pond is completely drained, the farmer will plant a crop of rice or sorghum in the dry bed to serve as a food source for the crawfish.

"I prefer to plant a mixture of rice and sorghum/Sudan grass," says Sterling Davenport of Millpond Crawfish, Inc. "If the summer is dry, the sorghum and Sudan grass will grow well. If it's wet, the rice will thrive."

The crop is allowed to grow until early fall, at which time the pond is flooded again to a depth of 8 to 12 inches. The adult crawfish and their young come out of their burrows and distribute themselves around the pond, feeding on the detritus that falls from the plants. As the vegetation decomposes, dissolved oxygen levels tend to drop in the pond,

***Coy Domecq,** wearing a crawfish hat, unloads live crawfish at the Farmer's Market in Raleigh. The crawfish were cooked and sold to introduce North Carolinians to the pleasures of crustacean consumption.*

especially if temperatures are warm. An aerator with a filtration screen is often needed to keep oxygen levels up.

"If you see tadpoles poppin' to the surface or crawfish around the edges, you better start aerating fast," says Davenport.

During the winter, ponds are filled to their maximum level of 18 to 22 inches. The crawfish become inactive when water temperatures drop below 45 degrees. As soon as the temperatures warm up in the spring, crawfish begin feeding again. This is when harvesting begins.

Traditionally, harvesting is done with a simple wire cage similar in design to a crab pot. Generally, 15 to 20 traps are set per acre. Commercial bait or cut fish is put in the trap and the crawfish crawls in through a cone-shaped opening. Once inside, it cannot turn around and go back out.

Harvesting can be time consuming, and the larger operations in Louisiana are looking into mechanical devices to harvest crawfish. But for ponds of only a few acres, farmers simply "walk" the ponds in a set of waders, pulling a johnboat alongside and dumping the crawfish into containers. As Sterling Davenport attests, this can be a source of unexpected excitement.

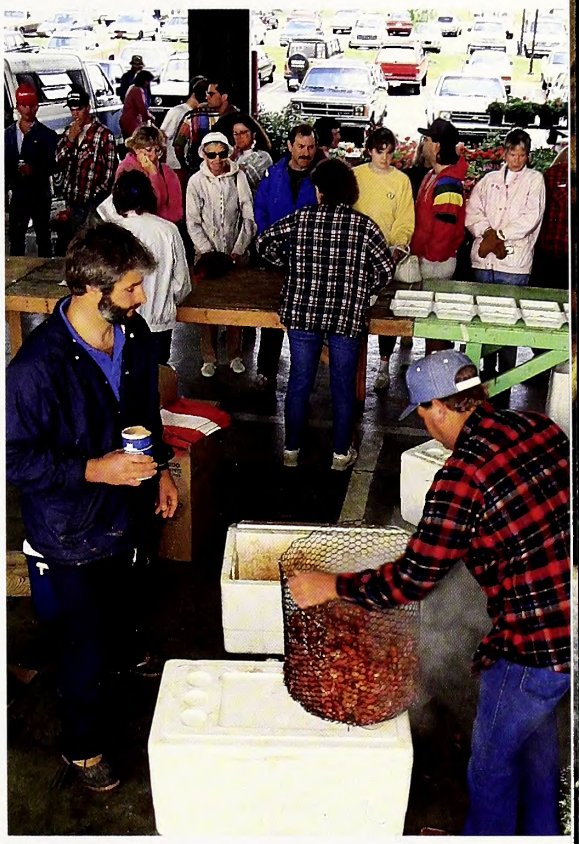
"I pulled up a trap the other day and found a snake inside the width of my arm," says Davenport. "It tried to squirm through the mesh, but got caught about a third of the way through. It struck at me once and missed. I took my knife out and whacked its head off."

Once out of the pond, crawfish are washed in fresh water to remove any grit or algae. They are then packed in boxes or bags to be shipped live to the customer. Coy Domecq, who ships and markets crawfish for Chowan Aquaculture, says North Carolina is renowned for the quality of its product. "When you get a sack of North Carolina crawfish, you get nothing but crawfish," he says. "Louisiana crawfish tend to have pieces of grit and sticks in them."

Crawfish are typically sold by the growers for around $2 a pound. Gabel says that price has brought most North Carolina farmers a decent profit. So far, demand for crawfish exceeds supply, so profits are virtually gauranteed if costs are held in check. Shoppers buying live crawfish at retail market prices, however, can expect to pay a lot more, if they can find them.

If North Carolina has one weakness, it is in the marketing of crawfish. Most growers lack the time or skill to engage in serious marketing and, as yet, there are only a few wholesalers in the state. So far, most marketing has been done by word of mouth and advertisements placed in newspapers and magazines. The largest buyers are restaurants, but individual buyers who simply want crawfish to eat are numerous and on the rise.

Sterling Davenport *empties crawfish from a trap in his specially constructed pond. Commercial crawfish production in North Carolina is still in its infancy, but it has lots of potential and is growing.*



Boiled crawfish were a big hit *at the Farmer's Market in Raleigh where hundreds of North Carolinians had their first taste of these creatures. That the event was a sell-out bodes well for the future of commercial crawfish ventures in the state.*

The North Carolina Crawfish Producers Association was formed, in part, to promote the marketing of quality, home-grown crawfish. It sponsors the annual Crawfish Boil in Raleigh and publishes a Crawfish Suppliers Guide. If the success of the boil is any indication, the red swamp crawfish is here to stay.

There is one other asset to growing crawfish, one that has appeal to sportsmen and other wildlife lovers. The same ponds and management cycle that favors crawfish also favors ducks. It is a connection that hasn't escaped the notice of growers in Louisiana.

Waterfowl will often winter on crawfish ponds, attracted to the food-rich shallows. So, of course, are predators like raccoons. They've been eating crawfish longer than we have.

How Well Do You Know Our Habitats?

Four years in the making, our brand-new 82-page book of natural habitats, *North Carolina WILD Places: A Closer Look*, is hot off the press.

by Lawrence S. Earley

No one thought it would take four years to complete. After all, *North Carolina WILD Places: A Closer Look* had begun as a modest publication about habitats for schoolchildren—somewhere between a coloring book and a short pamphlet. But before long the staff at the N.C. Wildlife Resources Commission's Division of Conservation Education found themselves involved in the most ambitious and one of the most rewarding educational projects they had ever taken on.

Today, the fruit of the division's effort is finally on display. After four years of preparation, *North Carolina WILD Places: A Closer Look* is off the presses.

North Carolina WILD Places: A Closer Look is a handsomely illustrated 82-page book that tells the stories of 13 of North Carolina's natural habitats. Whether you're from the mountains, the coast or somewhere in between, there's a habitat in this book near you. The mountain cove forest, the spruce-fir forest and the trout stream are covered in the section on mountain habitats. In the Piedmont there's the old field, the beaver pond and the Piedmont stream forest. Coastal Plain habitats include the bottomland hardwood forest, the Sandhills longleaf pine forest, the savanna longleaf pine forest and pocosin, and the Carolina bay. And along the coast, the salt marsh, the maritime forest and the ocean hardbottom are presented as well.

All of these habitats shelter different communities of plants and animals, yet they all have at least one thing in common: without them, many wildlife and plant species would perish. Indeed, many of these habitats or natural communities across North Carolina have been seriously altered or even destroyed, endangering many of their plants and animals. Where longleaf pine forests used to grow in the Coastal Plain, for example, loblolly pine woodlands today dominate the landscape. They are equally green and almost as lush, yet they are very different from the original longleaf pine forest.

North Carolina WILD Places celebrates the natural forests and other habitats that greeted the settlers when they first set foot here. And it seeks to provide answers to some basic questions:

- Why is habitat so important to wildlife?
- How are animals and plants adapted to their habitats?
- Where are the major habitats in the state?
- How are habitats changed, both by humans and by nature itself?

At the heart of the book are the sections describing the habitats and the accurate and detailed illustrations by Raleigh artist Anne Marshall Runyon depicting each habitat and its characteristic plants and animals. Some are showy and well-known, but many others are not what you might call household names.

In the "Piedmont Old Field," for example, the inhabitants include the red-tailed hawk, a handsome red fox and two white-tailed deer feeding beneath an apple tree. But also included are an Eastern black swallowtail butterfly, a common flicker, a cotton rat, a meadow vole and a host of grasses, wildflowers and trees.

Animals are shown as they exist in nature, hunting and being hunted by other animals. In the illustration accompanying "Longleaf Pine Savanna and Pocosin," an eastern glass lizard has grasped a grasshopper, but behind it an Eastern king snake has its eye on the lizard. Discussions of predator-prey relationships and food chains are brought to life by the illustrations.

Wildlife activities such as raising young are also depicted in many of the illustrations and explained in the text. The "Carolina Bay," for example, is set in winter to show various life stages of a variety of frogs and salamanders —egg, larva and tadpole as well as adult. So that readers can find the species in the illustration, a numbered key indicates where each plant and animal species appears.

The primary audience is schoolchildren from the eighth grade up, and yet the simply written text will appeal to adults as well. The writers discuss such important concepts as adaptation, carrying capacity and limiting factor, and they explain the origins of the habitat and the inter-relationships among the plants and animals. Bold type in the text

MELISSA McGAW

***Behind the book** lie unique contributions by the creative team: (left to right) artist Anne Marshall Runyon; editor Lawrence S. Earley; art director Donnan Robbins; designer/typographer Kimberly K. Cheek; division chief A. Sidney Baynes.*

signals plant and animal species that appear in each illustration. Interesting "Did You Know?" facts about each habitat are highlighted in special sidebars.

Why publish a book, especially one that would consume nearly four years of staff time? "The need was so great," explained A. Sidney Baynes, chief of the Division of Conservation Education which produced the book. "Over the years, our most frequent request from teachers has been for general information about North Carolina's wildlife and natural habitats. There just wasn't anything on the market that was providing what was needed. We believe that with the publication of this book and some of the other educational publications we've produced recently this need is being addressed."

To accompany the book, the Division of Conservation Education has also designed a series of colorful posters for use in the classroom, the office and the home. Two of the posters are from the book itself, colorful portraits of a mountain cove and a Piedmont old field. The third poster was created by Raleigh artist Jackie Pittman, whose drawings have often appeared in the pages of this magazine. Pittman's illustration—which is available as signed artist's proofs and a limited-edition art print as well as a poster—depicts a map of the state showing the 13 habitats.

To complete the *WILD Places* package, a field-tested teacher's guide for using the book in the classroom is also being prepared and will be available in the fall. Educational activities and games will make the concepts and the information in the book come to life.

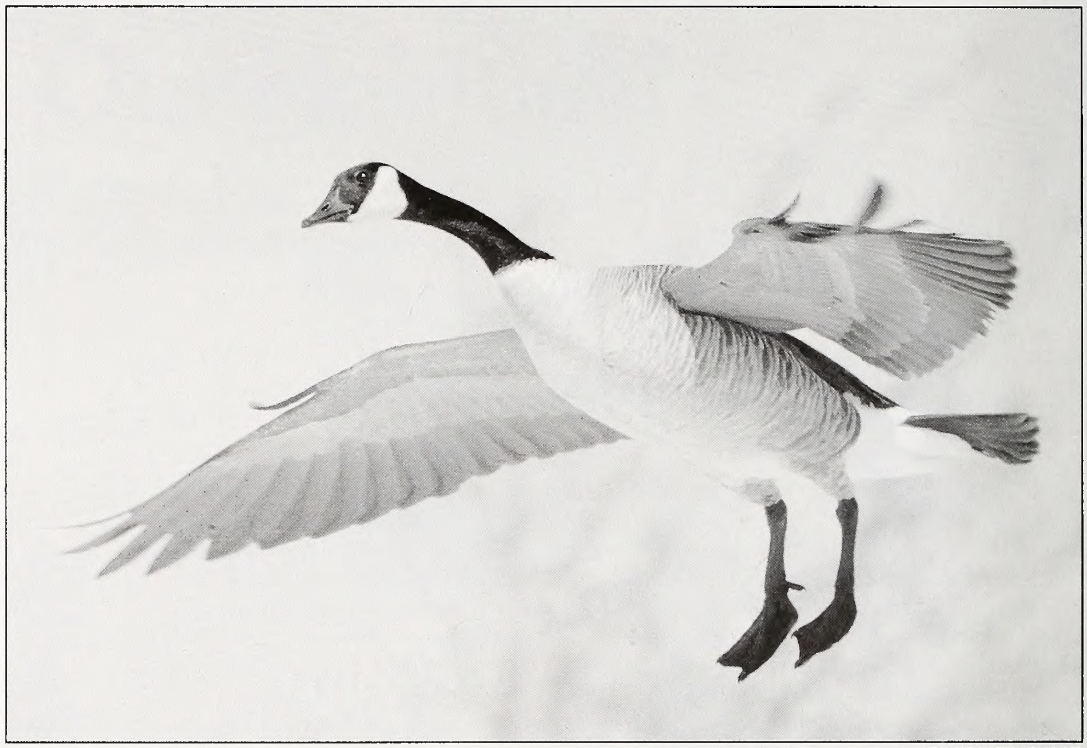
Four years is a long time to wait for a new addition to the family, but we're as proud of this offspring as new parents.

For ordering information, see p. 32 and use order form on adjacent page.

Sportsmen Need to Write!

New National Wildlife Refuge Plan Ready for Public Comment

Written and Edited by Vic Venters



NEAL AND MARY JANE MISHLER

***Issues such as** waterfowl, game, nongame and endangered species management, as well as the future of hunting, fishing and trapping on refuges will be decided when the U.S. Fish and Wildlife Service adopts one of its management alternatives proposed under Refuges 2003. The public is invited to comment on the proposals.*

This spring the U.S. Fish and Wildlife Service released its final Draft Environmental Impact Statement (DEIS) on *Refuges 2003*, which is the plan that will guide federal management activities on national wildlife refuges through the year 2003.

The DEIS outlines seven possible management alternatives, one of which will be adopted after public hearings this spring and the 90-day public comment period. The plans are based on several years of studying issues affecting the nation's refuges.

At stake is the future of fishing, hunting and trapping on refuges, nongame and endangered wildlife protection, wetlands acquisition, waterfowl management and a host of other issues that are environmentally and sociologically important. The document evaluates each of the seven alternatives with respect to 28 key management actions important to refuge operations. It notes the environmental consequences of each alternative.

If adopted, the Balanced Alternative, which is the Service's preferred alternative, would devote more management efforts toward protecting and enhancing nongame, threatened and endangered species. It would also protect unique aquatic ecosystems and conduct research and monitoring of biological communities. Management of game species would be emphasized as well, and some additional refuges would be opened to hunting where biologically appropriate. Recreational fishing opportunities would also be enhanced and increased where appropriate.

However, anti-hunting groups have been vocal opponents of hunting, fishing and trapping on wildlife refuges and have organized efforts, both legislative and through the DEIS, to eliminate these activities on all federal refuges. For instance, one of the alternatives under consideration —the Sanctuary Alternative—if adopted, would close all wildlife refuges to fishing, hunting and trapping, except on those refuges located in Alaska. It would also strictly limit wildlife research and monitoring activities. Access to refuges would also be curtailed, with the public largely restricted to the vicinity of administrative and interpretive sites. Another alternative—the Wildlife Observation Alternative—if adopted, would also curtail much hunting, fishing and trapping outside of Alaska.

Since the creation of the Migratory Bird Hunting and Conservation Stamp (Duck Stamp) in 1934, sportsmen have contributed the single-largest source of funding for acquiring wildlife refuges the nation—over $350 million. That's been enough money to purchase about 4 million acres of the refuge system's 12 million in the lower 48 states.

Currently, there are more than 485 refuges and 91 million acres of land and water in the national refuge system, with about 77 million of those acres located in Alaska. In North Carolina, there are currently 10 national wildlife refuges comprising over 500,000 acres, though only about 50,000 acres of this land are open to hunting. A decision to ban hunting on refuges could remove this approximately 50,000 acres from the roster of North Carolina's public hunting land.

An executive summary of the plan is available from the Fish and Wildlife Service and the agency is actively seeking comment on the seven alternatives.

"The public's comments and suggestions will play a role in the alternative we adopt," said Steve Vehrs, refuge program specialist for the U.S. Fish and Wildlife Service in Washington, D.C. "We prefer written comments."

A regional public hearing will be held in Atlanta on May 11. For more information on the Atlanta public hearing, contact the Service's *Refuges 2003* Coordinator at (404) 331-0830. Sportsmen are urged to become involved in the public comment process on *Refuges 2003*.

For an executive summary, or to send your comments and suggestions, write: Chief, Division of Refuges, U.S. Fish and Wildlife Service, 4401 N. Fairfax Dr., RM 670, Arlington, Va., 22203.

—Some information courtesy of the Wildlife Management Institute.

Biologists and Sportsmen Invited

Nation's Experts to Attend Wild Turkey Seminar in June

Anyone interested in restoring wild turkey populations should attend an upcoming turkey habitat workshop to be held June 10-11 near Boone.

"A Workshop For The Practicing Turkey Manager" will feature one day of classroom seminars and one day of field tours to wild turkey habitat and habitat improvement areas.

Speakers include 14 biologists and experts from seven states and the National Wild Turkey Federation. Topics include population restoration, habitat management for pine and hardwood forests and impacts of disease, predation and hunting.

"It's no exaggeration to say that we've got the foremost wild turkey authorities in the United States coming to this workshop," said Rick Hamilton, workshop coordinator and extension forestry specialist for the N.C. Cooperative Extension Service.

"The technical level will be suitable for biologists as well as sportsmen and habitat managers."

The workshop is scheduled to held at the High Country Inn near Boone in western North Carolina. Sponsors include the N.C. Wildlife Resources Commission, the National Wild Turkey Federation, the N.C. Chapter of the Wildlife Society, the N.C. Division of Forest Resources, and N.C. State University's College of Forest Resources and Cooperative Extension Service.

Pre-registration by June 3 is required. The registration fee is expected to be approximately $25 for two days. All interested sportsmen or land managers are encouraged to attend.

For more information, contact Anne Coughlin, Educational Outreach Office, NCSU College of Forest Resources at (919) 515-3184.

MELISSA McGAW

***An upcoming turkey habitat workshop** this June will host some of the nation's foremost wild turkey authorities. The public is invited.*

CP&L Donates Funds for Signs

Coastal Wildlife Nesting Areas Posted with Warnings

Tread with care if you see signs displaying a turtle and a tern posted in coastal areas. The signs are being posted on barrier islands from the Cedar Island area to the South Carolina line and are meant to alert visitors to the presence of wildlife nests on the beach.

"The purpose of these signs is to inform the beach-going public about the need to prevent disturbance in these areas during nesting time for sea turtles and colony-nesting seabirds," said Randy Wilson, section leader for the Wildlife Commission's Nongame and Endangered Wildlife Program. "Walking, playing or driving in these areas can destroy critical nests. Visitors should view wildlife from a distance that doesn't disturb nesters at this critical breeding season."

Carolina Power & Light Company provided $8,000 in funding for the signs, posts and mounting hardware. "We're pleased to support this project to heighten public awareness of the plight of beach-nesting wildlife in areas of high human development," said Rick Yates, manager of biological assessment for CP&L.

Special care should always be taken when driving anywhere near bird or turtle nests. Not only can vehicles crush nests, but hatchling turtles and some newly hatched seabirds can become trapped in the tire ruts.

Nests of threatened loggerhead sea turtles and colony-nesting seabirds are protected by state and federal laws. Violations of these laws may be reported to the Wildlife Commission's toll-free hotline at 1-800-662-7137.

***Beach visitors** should be aware of signs like this alerting them that beach nesting wildlife is nearby.*

Calendar

On several occasions, events in this calendar have been changed without notice. Readers should check the contact before traveling to an event.

May 15

Niche Gardens in Chapel Hill is sponsoring a "Critters in the Garden" workshop that will teach gardeners about the likely insects, reptiles, amphibians and other animals that gardeners are likely to encounter. For more information, contact (919) 967-0078.

June 20-25

The 11th annual Fur, Fish 'N Game Rendezvous Camp will be held at the Millstone 4-H Camp near Ellerbe. Campers aged 11 to 15 study conservation issues and a host of other activities. For information, contact Leon Harkins at (919) 515-5575.

Biologist Asks for Studies

Do Released Pen-Raised Quail Hurt Wild Populations?

Dear Editors:

I enjoyed the article "Can We Still Save Small Game" in the March issue. Well done!

Regarding the reference to the effects of releasing pen-raised quail into the wild due to the possible transmission of disease and genetic pollution, I would like to see those aspects discussed in greater detail. Has too little research been done in those areas for anyone to have a firm opinion?

Certainly in the case of wild turkeys it is positively known that releases of pen-raised turkeys can have disastrous effects on wild populations. The releasing of pen-raised turkeys into the wild not only failed to produce populations with sufficient survivability to expand or provide recreational hunting, but often resulted in population declines of wild birds if released into areas already populated.

An article in *Wildlife in North Carolina* dealing solely with the possible effects of pen-raised quail on wild quail populations would, in my opinion, be very informative and worthwhile. The life histories, reproductive capabilities and survival problems of quail and turkeys are sufficiently similar (they belong to the same order) that the possible complications of releasing pen-raised quail into the wild should be intensely studied and the hunting public appropriately informed of the results.

I suspect that the widespread release of pen-raised quail that is now occurring is one of the major factors in the decline of this species.

—*R. Wayne Bailey*
Milton, N.C.

Editor's Note: Before retiring, Wayne Bailey was the Wildlife Commission wild turkey project leader from 1970 to 1980 and he served 25 years as a biologist with West Virginia's Department of Natural Resources. Mr. Bailey's letter mirrors concerns that some bobwhite biologists have regarding the effects of releasing pen-raised quail into wild quail populations. While it's well known that pen-raised birds rarely survive long in the wild, there have been no studies completed that can definitively answer questions about possible genetic pollution and disease transmission. However, several studies ongoing in the Southeast may provide some answers. Wildlife in North Carolina *will certainly report on those studies. Given the scale of pen-raised quail releases occurring today, there is potential cause for concern.*

N.C. WILDLIFE RESOURCES COMMISSION

***Whether pen-raised quail** spread disease and genetic pollution to wild quail populations is a question biologists are still seeking an answer for.*

Stickers Still Needed

Recreational Vessel Fee Law Amended

Last fall, the Recreational Vessel Fee was amended and is gradually being phased out by fiscal year 1995.

However, owners of certain recreational boats (that are more than 21 feet in length) are still required to display valid RVF decals. The RVF program applies only to the navigable waters of the United States where the Coast Guard has a presence, which in North Carolina is limited to certain coastal areas.

Federal law now requires these fees:

In fiscal year 1993: Vessels more than 21 feet but less than 27 feet — $35; vessels 27 feet, but less than 40 feet — $50; and vessels 40 feet and longer — $100.

In fiscal year 1994: Vessels at least 37 feet, but less than 40 feet — $50; vessels at least 40 feet and longer — $100.

In fiscal year 1995: effective October 1, 1994, the Recreational Vessel Fee program ends.

For general information about the U.S. Recreational Vessel Fee as amended call 1-800-368-5647. The number for ordering RVF decals is 1-800-848-2100. Credit cards are accepted.

—*Information courtesy of the U.S. Coast Guard.*

Wildlife Endowment Fund Report

February 1993

Principal Balance
$17,968,560.30
Interest Earned
$11,104,811.92
Total Receipts
$29,073,372.22
Interest Used
$4,123,817.48
Fund Balance
$24,949,554.74

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

All from Chatuge Lake

Spotted Bass Record Falling Fast

Twice in about a month, and for the third time in little over a year, the state record for spotted bass was broken. And for the fourth time in a row, the record fish came from the same body of water—Lake Chatuge in western North Carolina.

On Nov. 27, 1992, angler Kent Moffitt of Murphy set the latest record with a 5-pound, 15-ounce spotted bass landed from Chatuge Lake. Moffitt's catch surpassed a 5-pound, 4-ounce spotted bass landed about a month earlier on Oct. 24 by angler Charles E. Nelson of Greenville, S.C. Nelson's fish, in turn, had beaten out a 4-pound, 11-ounce fish caught from Chatuge by Kevin W. Rogers of Canton on Oct. 19, 1991.

This trio of recent record breakers from Chatuge superceded the 4-pound, 8-ounce record spotted bass taken from Lake Chatuge by angler Ronnie McDonald on Sept. 7, 1988.

Moffitt's record fish was 22 inches long and had a a girth of 16 1/2 inches. "As soon as I got it in the boat I knew I probably had a record," Moffitt said. "It bit a white spinnerbait in about 5 feet of water over submerged brush."

In addition to coming from the same lake, the four record spotted bass were all taken in October and November. "If you want to catch a record spotted bass, Chatuge Lake in the fall would be a good choice," said Micky Clemmons, the Wildlife Commission fisheries biologist for District 9. "The bass appear to be feeding heavily in order to fatten up for the winter."

"Chatuge is a good bass lake in general," Clemmons added, "probably because threadfin shad, a prime forage fish, are able to overwinter in the lake. In many other mountain lakes, the shad aren't able to survive the cold winters and, consequently, there's less forage for gamefish. Chatuge is slightly lower in elevation than some other mountain lakes and the shad are probably able to find springs in the lake that offer some thermal refuge from cold-water temperatures that might normally kill them."

Spotted bass are mostly found in western North Carolina. They are similar in appearance to a largemouth, but anglers can distinguish the two by looking for a patch of teeth located on the spotted bass's tongue. Spotted bass also often have a prominent horizontal band and thin horizontal streaks below the band on their flanks. Their upper jaw also extends only to the back of the eye. A bass identification chart showing largemouth, smallmouth and spotted bass can be found in the Wildlife Commission's annual *North Carolina Inland Fishing Hunting & Trapping Regulations Digest*, along with all pertinent creel and size regulations.

Disabled Sportsman Can Still Hunt

Dear Sirs:

I would like to let handicapped people know that you can hunt even with a disability as severe as being in a wheel chair. I have a son in a wheel chair, and he hunts every chance he gets. He has hunted for four years in earnest now.

We hope to start a handicapped sportsmen's club, and we would like other interested handicapped people to contact us at: Charles E. Allen or Joseph Allen, Route 1, Box 140-A, Biscoe, N.C. 27209-0936.

—Joseph Allen
Biscoe, N.C.

Preventing Massacres in May

by Vic Venters

The next two months are perhaps the most critical time of the year for wild turkey populations throughout North Carolina. Not only is peak hatching time approaching in early June, but turkey hens, nests and poults are most vulnerable to both predation and to habitat destruction by man at this time of year. With turkey populations still in the recovery stage in areas of the state, making sure turkey adults and poults survive and prosper in the breeding season is very important to increasing populations.

Move Up Mowing: While many farmers like to control vegetation this month, take especial care when mowing at or around fallow fields, forest openings, pastures, road banks and wheat fields. Each year, untold numbers of turkey nests are destroyed during May and June. Because of the hen's instinct to stay with her nest, it's not uncommon to destroy both the adult hen as well as any poults or eggs with the tractor and bush-hog.

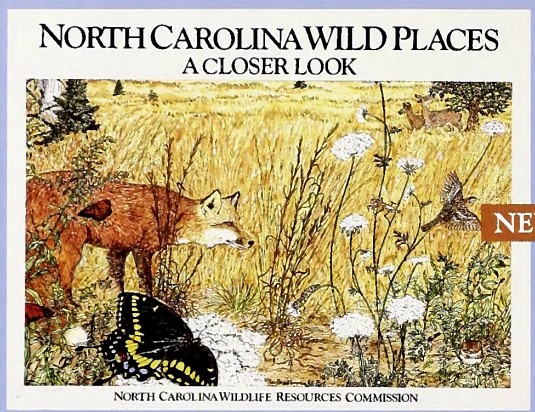
If you see a hen in an area while mowing, it's best to stop immediately and avoid the area. Try to give the hen a few more weeks—or months—to bring off her brood, especially if crop harvesting isn't critical.

In fact, for optimum wildlife management, mowing is best carried out in late winter, just before green-up. This allows all wildlife species to benefit from grassy cover during winter months and to have brood and bugging areas in the summer.

Predator Pets: While domestic dogs and cats should always be confined or closely supervised, it's especially important for pet owners to exercise control over their animals during spring breeding season, not only for turkeys' sake but for the sake of virtually all wildlife. Free-ranging domestic dogs can be efficient predators of both adult hen turkeys and their nests, while free-ranging cats kill poults and a wide variety of other ground-nesting wildlife such as quail, rabbits and songbirds. Unlike native predators such as hawks and bobcats, numbers of free-ranging domestic pets are not limited by food supply or availability of prey species. Consequently, their predation almost always comes at the expense of wild native species.

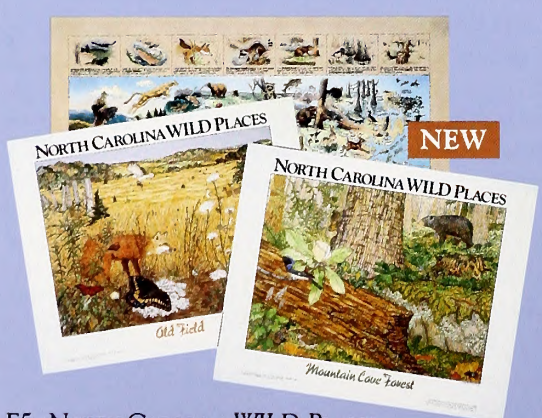
The N.C. *Wild* Store

Take advantage of these great items and you'll support conservation education throughout North Carolina. Proceeds from the sale of these publications will support the development and production of educational projects and programs.



E1. NORTH CAROLINA *WILD* PLACES: A CLOSER LOOK: *Easy-to-read text and Anne Marshall Runyon's delightful illustrations make wildlife habitats come alive in this 82-page book. Discusses 13 habitats across the state.*

E2-4. NORTH CAROLINA *WILD* PLACES MAP PRINT: *Charming, signed limited-edition art print showing North Carolina's WILD places as seen by artist Jackie Pittman. 1,000 regular and 100 artist's proof prints. Also available as a poster. 36" x 24". Shipped flat.*



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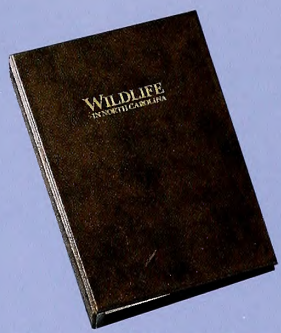

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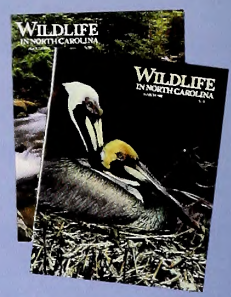

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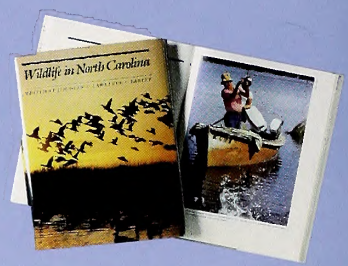

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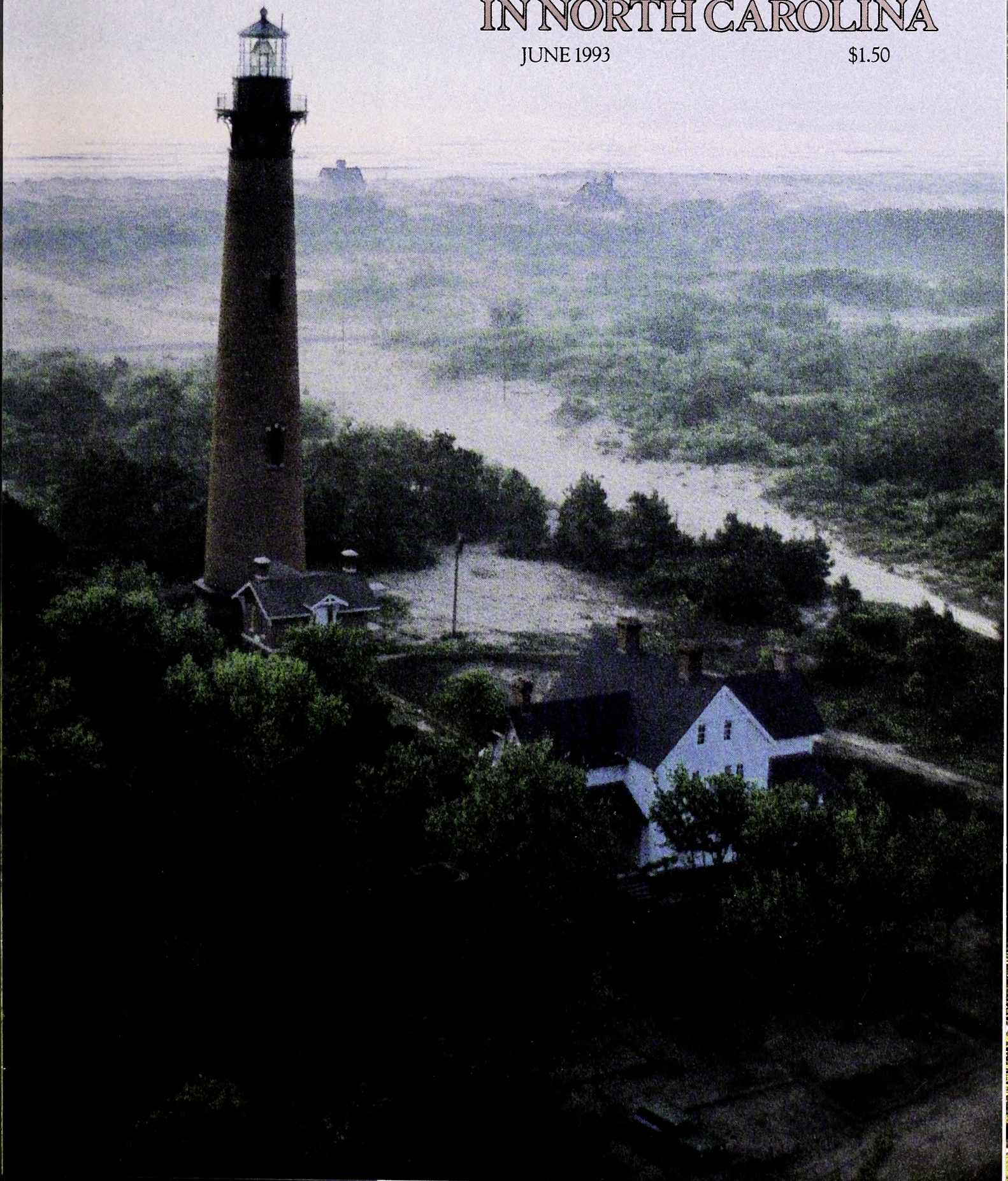
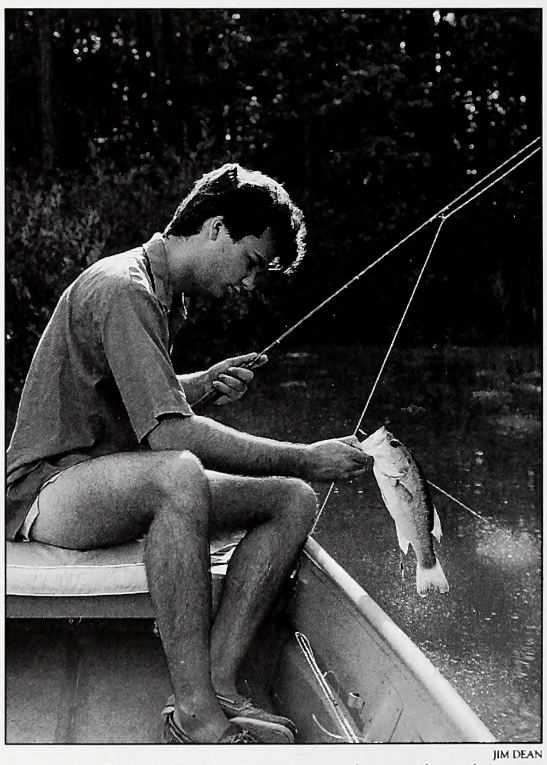


Fishing From a Box

by Jim Dean

Lots of people love canoes, and it's not hard to understand why. Canoes are traditional, handsome, lightweight, economical, versatile, responsive, have great load capacity and are seaworthy far beyond their size. I love canoes, but if I were restricted to owning one boat, it would be a johnboat—probably the most lowly, least fashionable and unlovely hull in the history of nautical architecture.

Obviously, we're not talking about aesthetics or affairs of the heart; a canoe wins hands down. Indeed, canoes can also handle much rougher water, and they're generally lighter and more responsive. Even so, I think a small johnboat is a better all-round choice than a canoe—or even a bass boat—especially if you're a serious fisherman.



JIM DEAN

My love of johnboats can probably be traced to the homemade wooden boats I learned to fish out of more than 40 years ago. These simple boats, squared off fore and aft with wooden seats nailed across the gunwales, could be rented at countless old millponds and river landings in eastern North Carolina. You'd pick out the one with the least water in it, bail it with a tin can, load up and shove off. With its low freeboard and rear seat set against a square stern, you could tirelessly skull it backwards all day long with one hand while fly fishing or cane-poling with the other. They weren't tippy like many canoes, either.

The same fine qualities exist in smaller modern johnboats, and because of their built-in floatation and rugged, light-weight aluminum construction, they are safer and more versatile than ever. My choice is a 12-footer since a 10-footer is too small for bigger water and a 14-footer is likely to be too heavy for one person to handle easily. You can get a quality 12-foot aluminum johnboat for around $350, and at a weight of 90 to 120 pounds, it's easy to load and unload. I've dragged mine into remote ponds and bounced it down high river banks with no damage or trouble, and two people can manhandle it virtually anywhere. Try that with a $20,000 bass boat.

As for seaworthiness, I've safely floated modest whitewater on Henry's Fork in Idaho and other swift western trout streams in johnboats. You can even fish big reservoirs by adding a small outboard if you're careful about boat wakes, avoid crossing large open expanses and keep an eye on the weather.

A 12-foot johnboat's biggest advantages, however, are useable space and comfort. Nothing for its size beats it for hauling one or two anglers, a dozen rods, tackle boxes, coolers, cushions, camera bags, nets, paddles, anchors, extra clothing and all the other junk fishermen carry.

When I bought my present 12-foot aluminum johnboat in 1976, I also decided to add a lightweight, rust-free galvanized trailer. The trailer has proven to be less trouble than cartopping—though that's a simple alternative—and I can still get in and out of tight spots. Several years ago at Harris Lake, there were more than 40 bass boats waiting to use the ramps at the end of the day. The line of cars stretched far out of sight. We ran my johnboat against the shore, unloaded our gear and carried the boat to the trailer. We were out of there in 15 minutes, much to the exasperation of those waiting. I've even used the boat and trailer as a substitute truck when I needed to carry a load of hay, trash or other stuff.

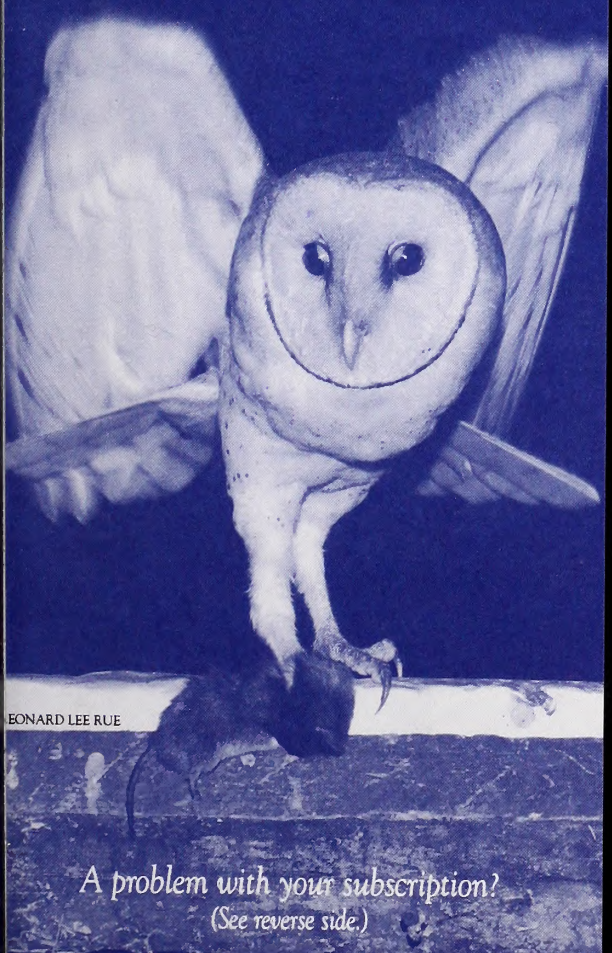
With only a bit of ingenuity, you can customize a johnboat for greater comfort and versatility by mounting it with removable swivel seats with backrests. Some fishermen add a deck on the front with a motor mount for a foot-controlled electric motor. Simple anchor winches and even lockers or live wells can also be installed. One friend made these add-ons removable so he could convert to a lighter, more portable rig for duck hunting. Another useful accessory is a portable depth-finder, the kind with a suction-cup transducer that fastens to the transom.

If a small johnboat is beginning to sound more appealing, here are some suggestions. Choose an electric trolling motor with enough power to push you along at a good clip—it'll save time on larger bodies of water or when wind is a factor. My 28-pound thrust Minnkota does a great job, and it is also capable of being tipped forward easily so that I can run the boat ashore anywhere or remove weeds. An even more powerful motor might be worth considering.

Instead of getting a large 12-volt, deep-cycle marine battery as recommended, get the kind of 12-volt battery used in compact cars. They're smaller and much lighter, yet have plenty of power. For dawn to dusk trips on big, windy lakes, I sometimes carry two of them, and that's more than enough to run me around all day.

If you want a whitewater love affair, get a canoe. If you want a second mortgage, get a bass boat. If you want practical fishing boat that'll go almost anywhere, get a johnboat.

Predators Belong



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Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and also to the environment we share with them.

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Wildlife Through the Year *by Vic Venters*

Cover *This photo of Corolla Lighthouse on the northern Outer Banks was taken in 1982. Eleven years later, development is transforming the Currituck Banks. Photograph by Ken Taylor.*

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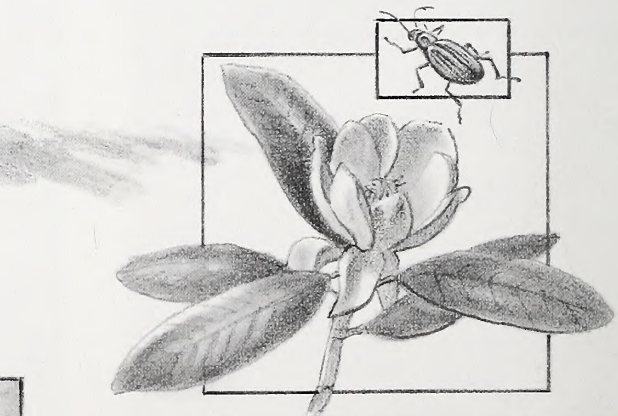
The magnolia tree *is among the most primitive of flowering plants on earth, arising over 100 million years ago. Most species in North Carolina are deciduous, while a few are evergreen.*



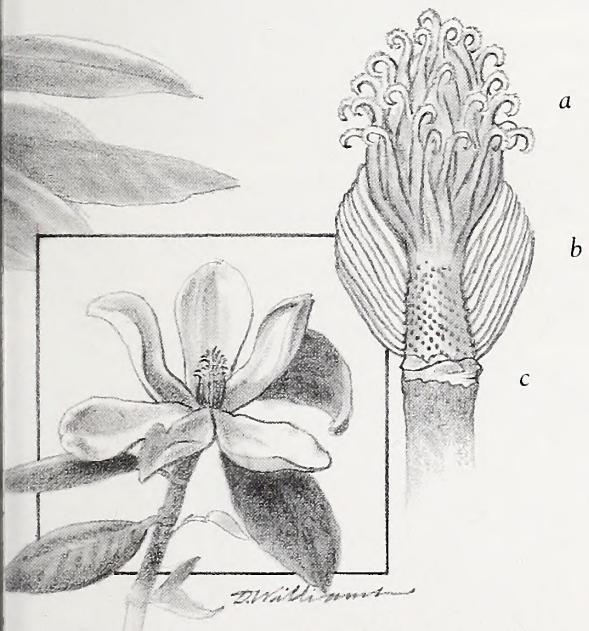
Magnolia pollination *occurs when the petals part slightly giving access to tiny beetles attracted by the fragrance of the nectar. The beetles carry pollen from one plant to another.*

The sweet-smelling blossom *of the magnolia begins as a tight bud. The flower has several primitive characteristics—many petals in a ring, many pollen-carrying stamens and a cluster of pistils, each with a pollen-receiving stigma.*

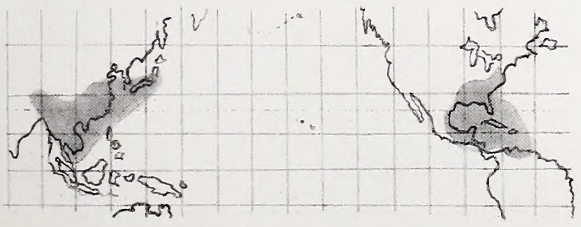
Ancestors of Spring

written by Lawrence S. Earley/illustrated by David Williams

***Seed production** is the ultimate goal of every flower. In the fall, the magnolia's cones contain many fruits, each with one or two red seeds that hang by threads. Birds eat these seeds and help disperse them across the landscape.*



***Magnolia blossoms** eventually drop their petals, leaving the flower's reproductive organs exposed: (a) the pistils and (b) the stamens, shown with the front ones removed. Scars (c) show where the petals were attached.*



***Magnolias have** a disjointed range—along eastern North America to Texas, Central America and Venezuela, and throughout parts of southeast Asia.*

You can't go anywhere in the lowlands this month without being floored by the heady fragrance of magnolia. With their large, creamy-white flowers—in some species they grow as much as a foot across—and dark green leathery leaves, these beautiful and aromatic trees are familiar presences in landscapes of every sort.

Though magnolias are among the latest of our spring bloomers, their ancestors were among the earliest of earth's flowering plants. Fossil remains of extinct, magnolia-like plants have been found as far back as the early Cretaceous Period (about 125 million years ago), and their descendants persist today with remarkably little change.

The origins of these primitive flowering plants are still mysterious. Flowering plants, or angiosperms, are thought to have arisen well after the conifers (gymnosperms) had advanced plant evolution through wind pollination. But during the dinosaurs' reign, plants resembling today's magnolias pioneered what was then a revolutionary kind of reproductive method—pollination by insect. It was so successful that the result is all around us today—a springtime display of flowers of every size and description, ranging from the relatively simple structures of the magnolias to the complex and highly specialized organs of the orchids.

Beetles were the dominant insect when magnolias first evolved; it would be several million years before other pollinators—bees, wasps, butterflies, moths, birds and bats—enabled plants to diversify in a thousand directions. Even today it's mainly beetles, and only secondarily bees, that carry on the work of magnolia pollination. Searching for pollen and other foods, the beetles crawl into the tight, erect blossom of a young magnolia flower. Clumsily negotiating the inner recesses of the flower, they deposit pollen carried from another flower's stamen onto the stigma, thus completing pollination.

The magnolia's fruit develops during the summer and, in the fall, the seeds, now bright red, emerge from the cone-like fruiting structure and hang by threads to be eaten by birds. The bright colors of the seeds attract birds to carry them farther than the tree could drop them.

Magnolias have an unusual distribution. They were once part of a broad forest that occupied much of the northern hemisphere, growing quite close to the polar region. But when the climate grew colder, this forest pushed south into two main areas: eastern North America, with outlying populations from Mexico to Venezuela, and eastern and southern Asia (China, Japan and India). Thus magnolia trees are among many other tree species—including sassafras, yellow poplar and sweet gum—common to North America and Asia.

About 80 magnolia species are found worldwide, although only eight are native to the United States and six to North Carolina. Native magnolias include the Coastal Plain's Southern magnolia (*Magnolia grandiflora*), the sweetbay magnolia (*M. virginiana*), also found in the Coastal Plain, and the Fraser magnolia (*M. fraseri*) located in the mountains. Although native to North Carolina, many of these magnolias are only a small component of our forests, appearing normally as ornamentals. Along the coastal Gulf region, however, magnolias are an important part of the beech-magnolia forest type.

As the aroma of magnolia trees softens the air, think of these trees as haunting relics of the earliest days of flowering plants, an experiment so successful that today we measure spring by their presence.

END OF AN ERA Part 1: *Paradise Lost?*

In little more than a decade, rapid development has covered Currituck's wild Outer Banks, and it shows no sign of slowing. Meanwhile, the Sound's waterfowl and largemouth bass have nearly disappeared, and the future of the region's sporting heritage is in doubt.

by Lawrence S. Earley

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A grim-faced guard near the county line was my first introduction to Currituck's Outer Banks 13 years ago. After halting me and examining my pass, he waved me on. Besides the empty road to Corolla, there were few other human signs—the eaves of a house rising over the maritime scrub forest, an occasional dirt road snaking off through the trees. I was conscious mostly of forest and dune and the far-off clamor of wild ducks.

I felt privileged to be there, as if I were being allowed to visit a private garden at a friend's family estate. Privately owned and jealous of its isolation, Currituck's Banks had that kind of reputation. It had another kind of reputation, too, for its marshes and waters sheltered one of the greatest wintering concentrations of waterfowl on the East Coast, where wealthy sportsmen carved out vast hunt clubs as early as 1857 and where prodigious shooting and bass fishing became part of American sporting legend.

On a pleasant February afternoon 13 years later, a sign at the county line recalls the legend—"Currituck County, Sportsman's Paradise, Founded 1690"—but there have been a few changes in the intervening years. The guard station is gone and the road is now public, an extension of NC 12 linking Currituck to the rest of the Outer Banks. Photographer Ken Taylor and I see signs advertising oceanside homesites and an indoor racquet club, luxury subdivisions, boutiques. There's even a Food Lion. At the entrance to Corolla Light Resort Village, a herd of wild horses crops Bermuda grass.

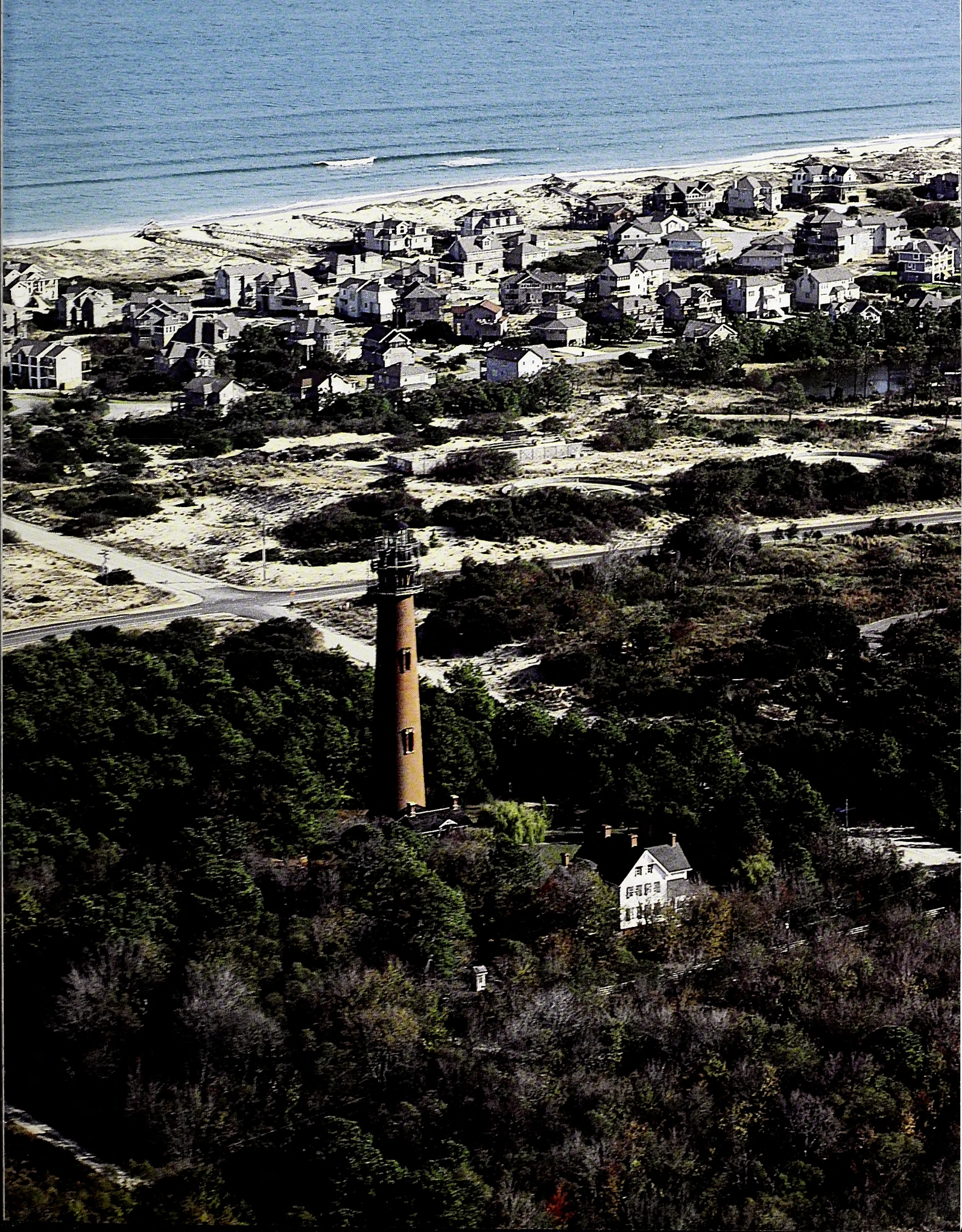
Change has swept through Currituck at a pace few can believe. Given the economic forces behind the intensive development elsewhere along the Outer Banks, Currituck's pristine spaces lasted longer, perhaps, than they had any right to expect. Yet it's still a shock to see the region undergo the equivalent of a personality change, especially in such a short time. For those who knew it as a wildlife paradise, it's been hard to accept its current identity as a high-toned vacation community, even harder to watch as the waterfowl and bass—the basis of the Currituck legend—disappear by the year.

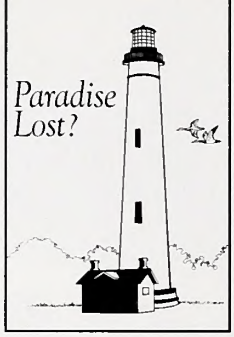
This is the story of old Currituck and one that's aborning, of the Currituck of sporting legend and the new one of vacation homes and shopping centers, of a region where the ducks and bass were once beyond counting and a region where they have virtually disappeared. It's a story of a landscape in transition and of the different ways that people are responding to these changes.

Understanding the legendary Currituck requires a sense of its physical landscape. The Currituck Outer Banks is only 23 miles long from the Virginia line to the Dare County border and it swells to a mere 6,000 feet wide; at its narrowest point it's 1,000 feet wide. Currituck Sound itself, that celebrated body of water, is scanty as well—40 miles long, 10 miles wide and about 4 feet deep on average, dimensions that moved one writer to call it "The World's Biggest Bass Pond."

Yet though skimpy in terms of real estate, by the early 20th century every inch of Currituck's Outer Banks belonged to a variety of membership hunt clubs that included the Currituck Shooting Club, founded in 1857, the Swan Island Club (1870), the Monkey Island Club (1919) and the Whalehead Club (1925). The northerners who were founders and members of these and other clubs possessed wealth beyond the reckoning of local landowners and so, like medieval baronies, each club easily accumulated thousands of acres of island, marsh, dune and beach. Clubs

The development of *Currituck's famed Outer Banks has occurred swiftly, as shown in this photograph of the Corolla Lighthouse and keepers quarters taken in 1992. Contrast this picture with the cover photo, shot from nearly the same angle, dated 1982.*





enlisted the services of hunting guides, skiff makers, decoy makers and marsh guards from among the local citizenry, and they built club houses of varying architectural merit.

In this patrician atmosphere, the sportsmen enjoyed prodigal shooting unrestricted by seasons or limits. Of course, club members had to work hard just to get to Currituck. Before the automobile, members traveled by rail to Norfolk and by boat and even oxcart to Poplar Branch where skiffs carried them across the sound. And once they arrived, life in a club wasn't necessarily a bed of roses.

"The strip of sand that separates the Atlantic Ocean from Currituck Sound is the very embodiment of desolation," wrote one journalist after an early visit. "In winter, storms careen over it at will, and the low marshes and sea-meadows are alternatively flooded with water and swept by shifting sands, and in summer the sand-flies and mosquitoes make life a burden."

But roughing it with one's social peers was pretty much the whole point of joining a hunt club, and the privations made good stories for the members. Indeed, until the 1960s, the Currituck Shooting Club had no electricity, says club caretaker Richard Beaseley; and as late as 1972, no paved road existed on the Currituck Outer Banks.

As communities elsewhere on the Banks gradually submitted to commercial and tourist development, Currituck's exclusive clubs kept the northern banks nearly pristine well into the 20th century. But by the 1940s, 1950s and 1960s, some of the clubs had lost their vigor, and rising land values made it easy to sell their land. By the late 1970s, most club lands were platted for development, although little construction had actually taken place. The main impediment was the absence of a public road. In 1972, a private road was built from Pine Island to Corolla and a guard station near the Pine Island Club barred all but property owners and residents.

But when the state took over the public road at the end of 1984, a flood of development swept over the banks. The country was in the midst of a full-fledged real estate boom and Currituck Banks was shortly in the thick of it. Land values skyrocketed and from 1984 to the present, a string of subdivisions and planned unit developments engulfed the previously pristine banks.

"Northerners with a half-acre lot worth a million or a million and a half could sell it and buy an ocean lot here for half that," says H. B. Briggs, chief planner for Currituck County. "Currituck was virgin land."

By 1990, there were 14 subdivisions on Currituck's Outer Banks with 1,400 homes built or under construction. Nearly 8,000 lots had been platted. The rest of the county was growing rapidly as well.

KEN TAYLOR

Driving north toward Corolla from the county line, Ken and I are astonished at the scale of the development. At Monteray Shores subdivision, a shopping center and restaurants stand on land that once belonged to the Whalehead Club. Corolla Light Resort Village, also on Whalehead Club property, consists of residential lots, shops, an oceanside sailing marina, a tennis club and an indoor sports center.

On the wind-swept dunes of a new subdivision called Pine Island, land formerly belonging to the Pine Island Club, we cruise past oceanside lots of an acre or less costing as much as $360,000 apiece. The 2,800-square-foot model house we tour, with extravagant space, light and views of both ocean and sound, costs about $400,000. Nearer the beach, an even bigger, 5,000 square-foot house is under construction.

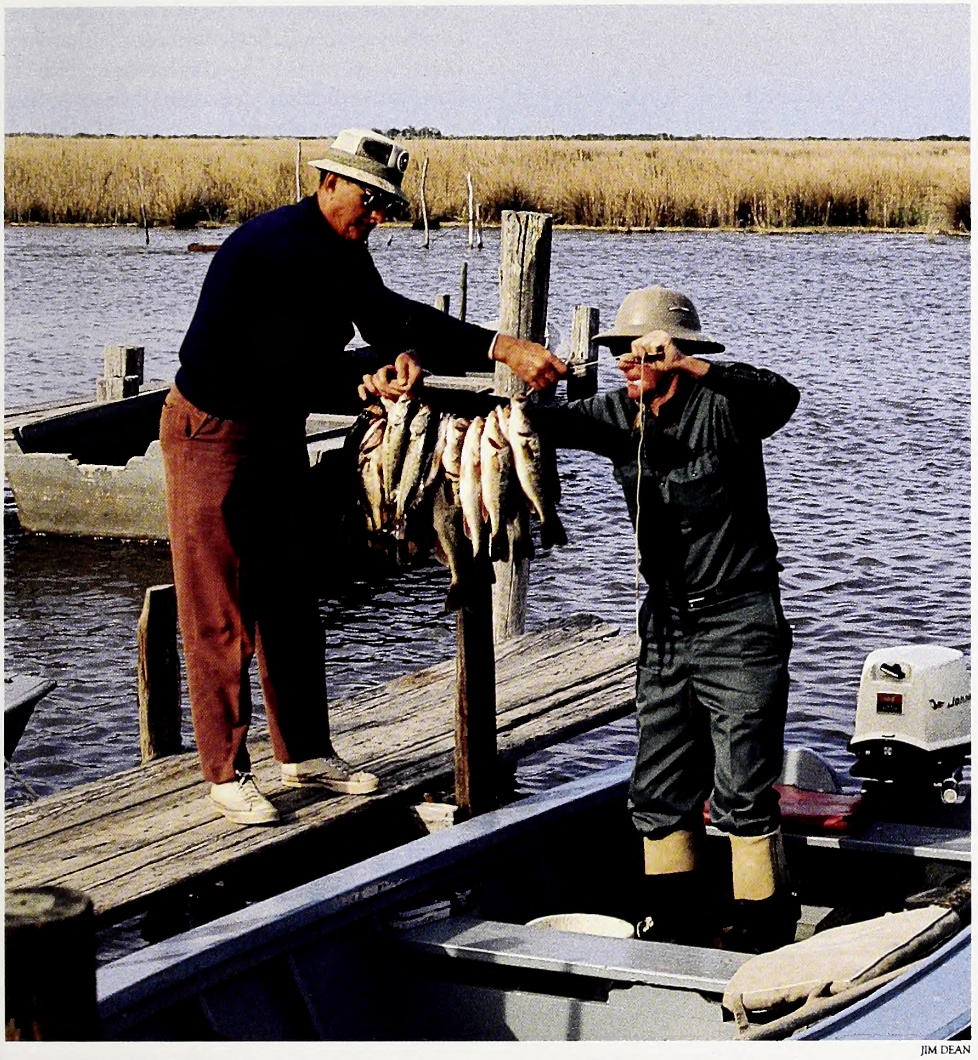
The 56 homesites are only the first phase of a development complex that will encompass 350 units and an inn. "In a few years, we'll have a beach club with indoor pools and health clubs," says salesman Ralph Hodges III. "We've already got a 5,000-foot landing strip that can accommodate corporate jets, plus the indoor tennis courts and racquetball courts."

The entire development is aimed at the upper-end of investors, Hodges adds. The buyers who troop through the house want all the amenities. Most of them are from Washington, D.C., Philadelphia and New York, and evidently their pocketbooks are recession-proof.

"As long as the lots cost less than $1 million, I'll have people standing in line to buy them," Hodges says.

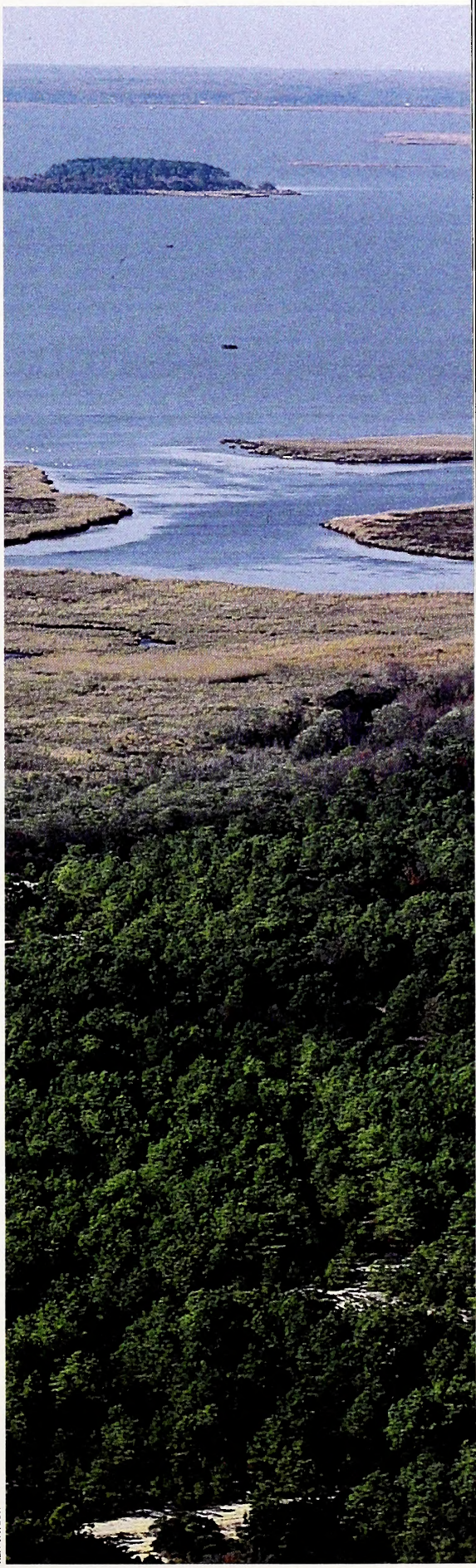
As development on Currituck's Outer Banks has skyrocketed, the area's fabled waterfowl and bass populations have plummeted. Not too long ago, Currituck Sound's wintering population of ducks and geese represented 10 to 15 percent of the entire Atlantic Flyway; in 1993, it was .04 percent. In 1972, Currituck's wintering waterfowl population represented over 50 percent of the state's total; in 1993, it was about 4 percent. Last winter, the N.C. Wildlife Resources Commission's midwinter waterfowl survey, an approximate count of the number of ducks and geese in the state, found less than 12,000 waterfowl in the sound, and about 7,000 of them were

Swan Island Hunt Club *was one of several hunting clubs that wealthy sportsmen established on Currituck in the 19th and early 20th centuries. Northern sportsmen flocked to the region to take advantage of the large concentrations of wintering waterfowl.*



JIM DEAN

***Weighty stringers of** largemouth bass and knowledgeable local guides such as Wilton Outlaw (at right in photo above) played important parts in Currituck's sporting legends. Currituck Sound's brackish waters were fringed by marshes and forests and dotted with small islands (right).*



KEN TAYLOR

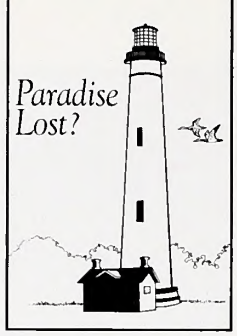
snow geese. This number compares with a high of nearly 300,000 waterfowl in 1976 and over 100,000 in 1981.

Biologists have been shocked not only by these numbers but by the changes in waterfowl behavior they've been observing from the air. For the last 17 years, Dennis Luszcz, the Commission's waterfowl project leader, has been flying over coastal areas, including Currituck, twice a month from October through February. Once, he could see thousands of birds rafted up on the open water. Today, it's unusual to see waterfowl on the water at all. Instead, ducks and geese are feeding in the impoundments that have been created in the inland areas. "That tells you that they can't get what they need from the open waters or that the impoundments are that much better," Luszcz says.

Another sign that Currituck is failing waterfowl can be seen in the changing behavior of coots. Coots are well-known associates of aquatic vegetation and in Currituck they were once as common as mosquitoes, with over 100,000 wintering there not long ago. Now the large concentrations of coots are going elsewhere, especially to Lake Seminole, Ga., says U.S. Fish and Wildlife Service biologist Otto Florschutz. It's unusual to see coots in Currituck. Populations of other open-water ducks such as gadwalls and widgeons have also fallen.

The fortunes of waterfowl have been equalled by those of Currituck's bass. Serious anglers once considered Currituck one of the half-dozen best fishing spots in the world, with colorful traditions the equal of its waterfowling. The water's rich beds of eel grass and celery grass not only sustained waterfowl but bass as well. Once the ducks flew north, many of the hunting guides became fishing guides and poled their clients into secret marsh ponds up and down the sound in their rugged juniper skiffs.

"Currituck was to bass fishermen what Henry's Fork in Idaho is to trout fishermen,"



says Jim Dean, editor of *Wildlife in North Carolina* and a frequent Currituck visitor, "If I had three or four days to relive, it would be in Currituck in the early 1970s, in May, just after two or three days of southerly breezes. The fishing was phenomenal then."

Even when Eurasian milfoil began to cover the sound in the 1960s and 1970s, fishing continued to be good, if not better. The nuisance weed fouled boat props and lures, and biologists and botanists worried because it was displacing the native aquatic grasses. But the fishing guides loved it. Milfoil was excellent cover for bass and for the small crustaceans, aquatic insects and fish that fed the bass. When fishing guides learned how to fish in milfoil, their clients continued to bring home long stringers of bass.

Milfoil probably shifted the structure of the fishery to smaller fish, says Pete Kornegay, N.C. Wildlife Resources Commission fisheries biologist, but the bass were still there. By the 1980s, when the milfoil began to disappear, the displaced native grasses didn't return. "Now that we don't have milfoil," Kornegay says, "we don't have bass."

What's happened to Currituck that has caused ducks, geese and bass to forsake it? Many reasons have been suggested, both natural and human-caused. Among the natural causes proposed were the severe droughts of the mid-1980s that devastated waterfowl breeding habitat in Canada and the prairie pothole region in the northern United States. When farmers took advantage of the drought to convert the wetlands to additional farmland, waterfowl reproduction took a hit that it is still reeling from. This, suggest some biologists, is partly behind the serious erosion of waterfowl populations in the 1980s.

The devastating droughts are also thought to help explain another phenomenon that may be affecting the fish and waterfowl—high salinity levels. The saltiness of an estuary's waters is a primary factor in determining the fish and wildlife that are found there. Freshwater fish like largemouth bass, crappie

KEN TAYLOR

***Subdivisions crowd** the beach front as the Currituck Outer Banks develop at a breakneck pace (right). In less than 10 years, hundreds of upscale residences have been built. These wild horses, part of the Currituck herd, crop the lawn in front of a subdivision (above).*

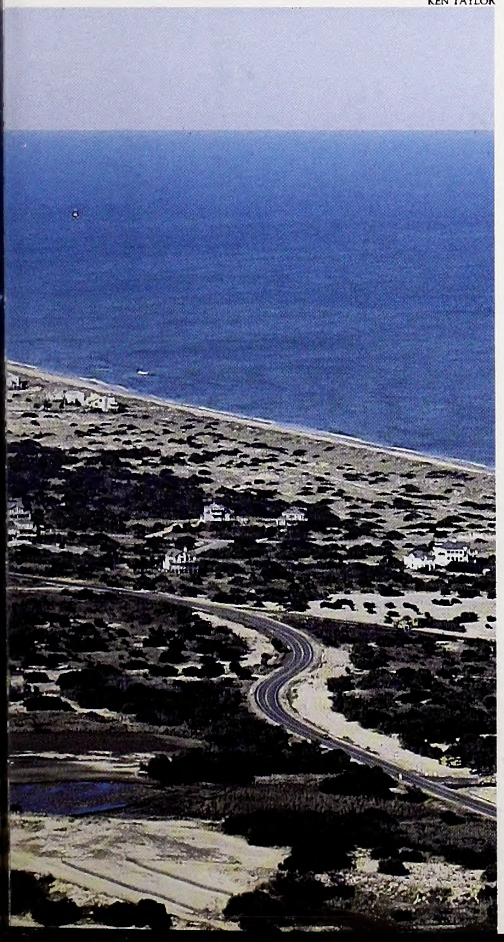
and bluegill can't tolerate high salinities, and marine fish are intolerant of water that's too fresh. Indeed, up until 1828, Currituck Sound was open to the sea and its salt-laden waters hosted oysters and marine fish. After New Currituck Inlet closed in a storm the sound's freshened waters hosted native aquatic vegetation that attracted both ducks and bass.

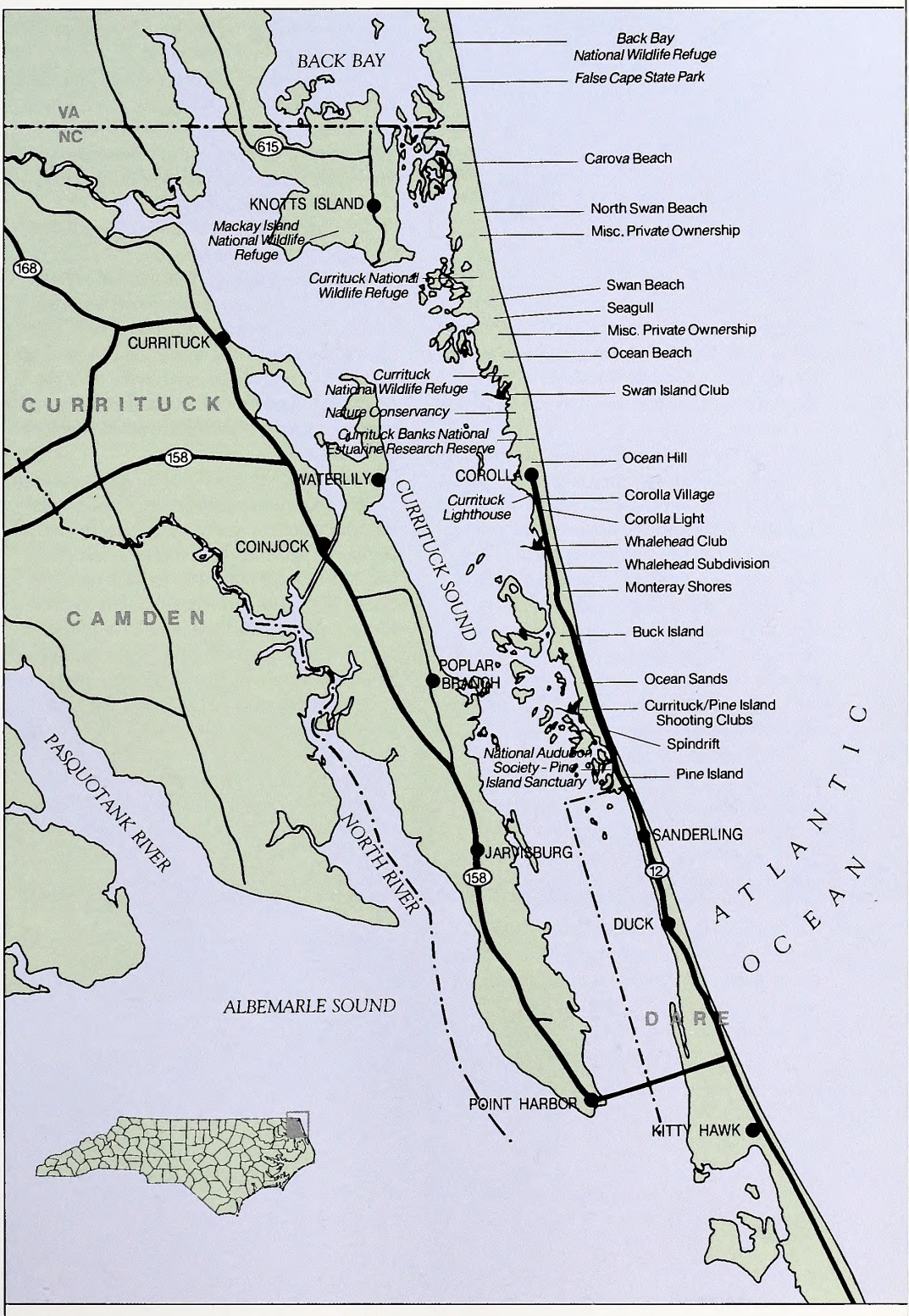
Even then, variable weather frequently altered the salinity. Currituck is so shallow that its salinity has been notoriously capricious, shifting from fresh to salty with almost every winter storm. One 19th-century writer reported, "... occasionally a furious storm will cause the old ocean to flow across these sandy stretches and fill the sound with salt water. The natives and clubmen regard this as a great calamity, as the salt kills the wild celery for a time, and the wild-fowl seek pastures new."

The most recent increase in the sound's salinity has been blamed on a number of factors including the mid-1980s' droughts and a couple of overwash storms during the same period. Increasing saltiness has also been blamed on a hydrological link between Chesapeake Bay and Currituck Sound. The transport of salt water via this link is not helping Currituck's salinity problems (See "Salt Socks Currituck Bass," May 1989).

But fisheries biologists admit that they can't pin down the role salinity is playing in the ailing bass populations. "It may be we have a situation where neither freshwater nor saltwater fish can tolerate those fluctuations

KEN TAYLOR

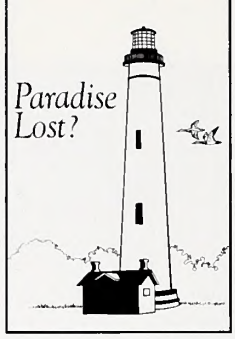




Currituck's Outer Banks Today

Pristine and mostly undeveloped 25 years ago, Currituck's Banks are crowded with upscale developments today. Building skyrocketed when a private road, NC 12, was made public in 1984. Natural areas on the Banks include state and federal tracts containing the Currituck National Wildlife Refuge and the Currituck National Estuarine Reserve, plus private properties owned by the Audubon Society and The Nature Conservancy.

Source: Currituck County Planning and Zoning



in salinity," says Kornegay. "So fishing in general is poor, both fresh water and salt water. But the more we study this situation, the more we suspect that man may have a hand in our salinity problems."

Could increased development in the Currituck region be playing a part in the diminished fish and waterfowl yields? Wildlife biologists have some hunches on the matter but have little data to support them. They superimpose Currituck's plummeting fish and wildlife trends over its skyrocketing human population trends and ask, is it only coincidental that during the most intensive period of development in Currituck history, we've witnessed a cataclysmic decline in the duck and bass populations?

"We've gone from maritime forest and shrub-mixed forest and sand dunes to some of the densest development I've seen on the northern Outer Banks," says Dennis Luszcz. "In some places in Currituck, it seems even denser than what's at Nags Head. And all this in the space of five or six years."

And it's not just on the Outer Banks side, biologists say. On the mainland, many fields where geese, swans and snow geese once fed have been turned into developments. One of the ponds where Commission biologists used to band Canada geese is now part of a golf course and the geese are gone. And that's happened just in the past year.

"Not only do you probably have increased runoff from paved surfaces and septic-tank contamination from these developments," says Luszcz, "but we're also witnessing an incredible number of people thrown into this prime wildlife habitat."

Tom Monschein, a Wildlife Commission biologist and another frequent flyer over the Currituck region, says that the loss of habitat has had a profound impact on waterfowl. "A lot of farmland and woodland have been cleared for residential areas," says Monschein, "and that's pretty apparent flying over the mainland. And the ocean side has more and more homes there and less available habitat for waterfowl."

Luszcz and other wildlife biologists strongly believe that human disturbance and worsening water quality are contributing to the decline in waterfowl populations, but they admit they have little data to back up their claim. Biologists with the N.C. Division of Environmental Management have found nutrient enrichment in the sound, and algal blooms, a sign of nutrient pollution, were discovered there early last year. It's not clear where the excess nutrients are coming from. Potential sources include natural processes within the sound's shallow waters, fertilizer-laden runoff from mainland farms and pollution from septic-tank fields. On the Currituck Outer Banks, most septic tanks are found in the older developments north of Corolla. South of Corolla, the new planned unit developments carry their own centralized water- and sewage-treatment plants, which are reported to be less harzardous to the environment.

In sum, the causes of Currituck's decline as a wildlife paradise are uncertain, although increased salinity and development may be involved. Some believe that the bass may bounce back after a few years of normal rainfall in spite of continued Outer Banks' growth. We'd know then that salinity had been the chief culprit. Lower salinity might potentially benefit waterfowl as well. Of course, this scenario doesn't factor in the long-term fate of these fish and fowl in an increasingly crowded and polluted sound.

A more chilling thought is that Currituck's contemporary ebb is just the death rattle of a gradual decline that began long ago. Graybeards have been shaking their heads over Currituck's health seemingly from the very beginning.

"In his youth," one local inhabitant wrote in the late 19th century, "the writer could see in two miles square more ducks than can now be seen in going from [Poplar Branch] to the Virginia line." Another mourned, "Years ago, two hundred ducks to a gun was no uncommon sport; now, one-fifth that number is considered a fair day's shooting."

Many believe that things could not get any worse, which may explain the pessimistic sense of finality in the region today, a conviction that the bottom has been reached, an era ended, and Currituck's sporting paradise lost forever. ⊠

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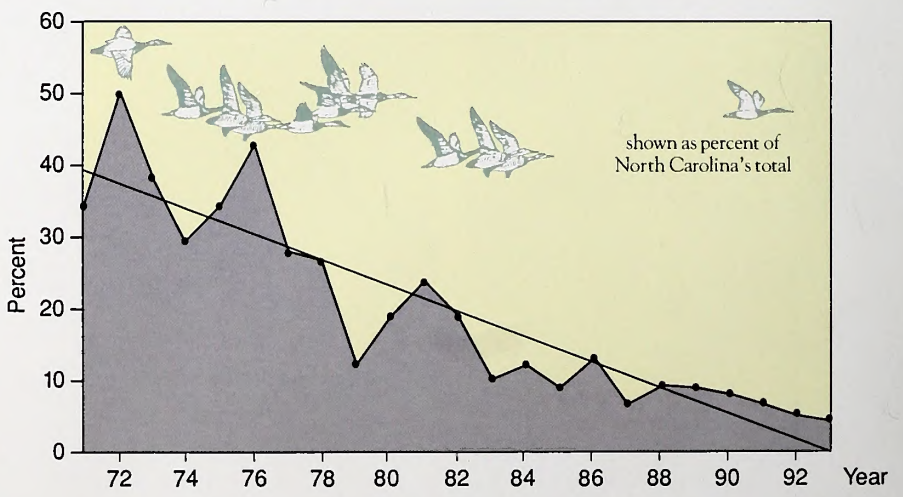
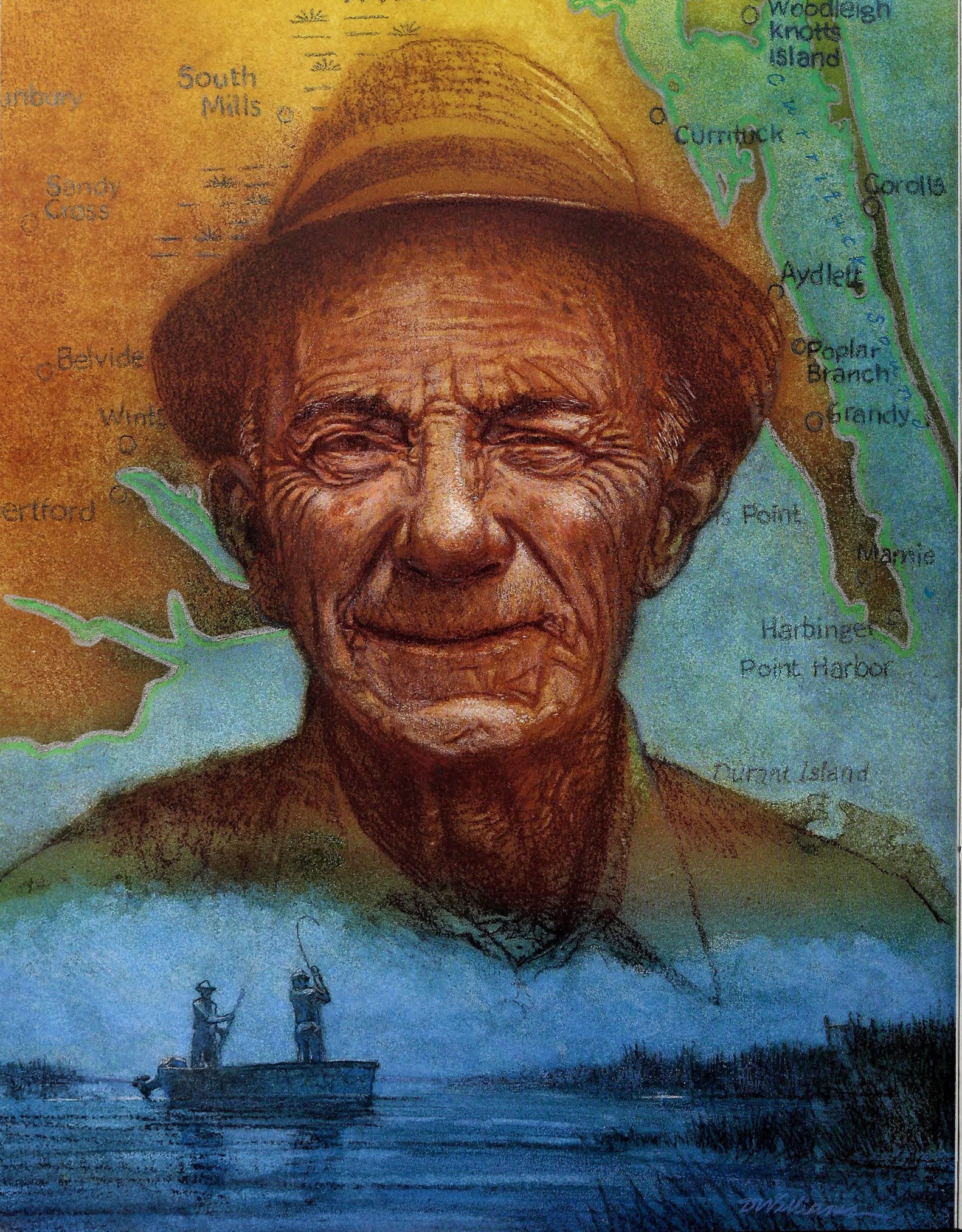
***Waterfowl fell** into Currituck's sheltering waters in such numbers that days like these (above) were common once. But waterfowl populations have fallen so low in recent years that some fear the sun has set on Currituck's hunting traditions (opposite page).*

Currituck's Plummeting Waterfowl



North Carolina's wintering waterfowl are increasingly less interested in Currituck Sound as a destination, according to midwinter waterfowl counts made since 1971. In the 1970s, the sound often hosted 30 to 40 percent of the state's ducks and geese. In the 1980s, state waterfowl totals fell sharply, and Currituck's percentage of this number continued to plummet. Last year, only 4 percent of the state's waterfowl wintered in Currituck.


South Mills
Sandy Cross
Belvidere
Winfall
Woodleigh
knotts Island
Currituck
Corolla
Aydlett
Poplar Branch
Grandy
Point
Marmie
Harbinger
Point Harbor
Durant Island

WALLACE O'NEAL REMEMBERED

He was one of the last of the colorful old-time Currituck Sound guides, and one of the best.

written by Buck Paysour © 1993
illustrated by David Williams © 1993

A snowy egret flew over as they buried my old friend and fishing guide Wallace O'Neal on a knoll overlooking his beloved Currituck Sound. From a distance a quail called *bob-bob-white, bob-bob-white* and a mourning dove cooed its sad song from nearby woods. The vast and often turbulent northeastern North Carolina sound licked gently at the shore. It was as if all nature had paused to mourn the passing of one of its own.

That was more than 16 years ago. But I still think of Mr. O'Neal—he was always Mr. O'Neal to me—every time I watch the Currituck sun come up out of a pool of fire, every time I see an osprey rise and fall on invisible thermal columns, every time a largemouth bass smashes my floating lure.

And I think of him each time I read the name of Drew Lewis, former U.S. secretary of transportation. Then, I remember how Mr. O'Neal, who had little formal education and lived a modest life, taught Lewis the true meaning of success.

When Mr. O'Neal succumbed to lung cancer he was 80 years old and was the oldest guide on the sound. That year he had guided through the spring and had booked fishing parties for the fall. During his more than half-century of guiding, people from all walks of life—rich and poor, famous and not so famous—had fished and hunted with him. He treated them all alike: with good-natured irreverence.

He demonstrated this trait the first time Hubert Breeze, then my city editor at the *Greensboro Daily News*, fished the sound with Mr. O'Neal and me.

"Hubert is my boss," I jokingly told Mr. O'Neal as we loaded our fishing gear into the skiff. "So be good to him." All day long Mr. O'Neal talked about Hubert being my boss. Finally, after we had paid Mr. O'Neal, he said, "I've figured out why he is your boss. His politics is better than yours."

In his skiff and on his sound, Mr. O'Neal was *the boss*. He refused to guide again for anybody who drank too many beers on the water. He thought serious drinking should be saved for the hunting and fishing lodge. He likewise withheld his future guide services for anybody who attempted to keep more than a legal limit of bass or bag more than a legal limit of duck or geese.

To me, Currituck is one of the world's most unusual and beautiful bodies of water. An occasional bald eagle stalks the sounds and marshes. Raccoons do not even stop their hunting as your skiff passes near. Swans bob on the sound's surface. Redwing blackbirds flit from reed to reed, their epaulets flashing crimson. In the fall, ducks crisscross the water and marshes, and Canada geese etch their Vs across the sky.

The sound was one of the few places in the world where you could catch largemouth bass, a freshwater fish, while listening to the ocean's roar and the mournful blasts of foghorns on ships. Only a splinter of land separates the sound from the ocean.

On one of our trips to the sound, Hargrove "Skipper" Bowles and Bill Black caught a limit of largemouth bass, and then a nice string of flounder—all in the same water on the same day. We joked with Bill and Skipper about going fishing for freshwater fish and catching saltwater fish.

"Don't knock it until you've tried it," Skipper said, flashing his infectious smile.

The sound was then fresh enough to hold many species of freshwater fish but just salty enough to hold some species of marine fish. Off and on over the years, storms that frequently rake the Outer Banks have blasted openings through Currituck Banks, allowing ocean water to pour into the sound. Each time, another storm eventually sealed the inlet again.

Once, after I landed a largemouth bass, Mr. O'Neal said, "You caught that bass over an old oyster bed." He rammed his shoving oar into the sound's bottom. It made a crunching sound as it struck the ancient oyster shells.

Sadly, Currituck Sound bass fishing is now so poor that my friends and I no longer make our twice-a-year trips as we did for years. We recently made one more pilgrimage just for old time's sake. We did not even expect to catch fish and we didn't. Some say Currituck's waters now have too much salinity to support largemouth bass. Others such as veteran Currituck guide Johnny Owens blame development and pollution.

"Look," Johnny told us as we fished Currituck on the recent trip. "The water is even a different color." Sure enough, it was greenish instead of the clear color it was during the years when you almost always caught your limit. Johnny said commercial fishermen were catching few saltwater fish in the sound, another indication that saltwater intrusion was not the only reason for the poor bass fishing.

At night on the trip that we made for old time's sake, we sat around talking about our Currituck fishing buddies who were no longer living: Skipper Bowles, Bob Ingram, Duncan Stephenson. And, of course, we told stories about Mr. O'Neal. I thought maybe it was good that he did not live long enough to see what had happened to his sound.

During the years I fished with Mr. O'Neal, Currituck was still pristine and undeveloped. Mr. O'Neal was as honest and as unspoiled as the sound. If you left a beat-up 75-cent lure in his skiff, he mailed it back to you.

Mr. O'Neal had a native dignity and seldom used serious profanity. Yet his language, like the brackish waters of his sound, had a trace of salt.

One fall day as the sun was dying in a spectacular blaze of gold and Jack Bilyeu of Greensboro and I had not had a strike in more than an hour, I said, "Mr. O'Neal, this is the last time I will be able to fish Currituck this year. I wish I could catch just one more bass before we leave."

"I'll take you to a place where you can see bass whether you catch one or not," he said. He yanked the starter cord on his outboard motor and thundered across the sound, flushing cormorants and sea gulls. He shut down the motor right in front of his house and near a spot darker than the surrounding martini-clear water, a sign of deeper water.

As he had promised, we could see shadows of fish lazily crisscrossing the hole, and we quickly caught several small ones. Then Jack stood up to land a larger bass.

"Get your arse down," Mr. O'Neal ordered. "You're going to scare my fish!"

Mr. O'Neal was remarkable both physically and mentally. Although he was barely 5 feet, 6 inches tall and slender, his arms bulged with muscles. He continued to fish long after gales had driven other guides off the water. He demonstrated his toughness the day a gust of wind caught my large topwater lure and I impaled his ear with a large fishhook. The red and white lure dangled from his ear like the earring of a Ubangi warrior.

To remove a fish hook, you are supposed to push the barb on through. But Bill Jerome of Greensboro, my fishing partner that day, and I recoiled at doing that. The hook was imbedded at an odd angle.

"Just jerk it out then!" Mr. O'Neal growled.

Instead, Bill and I unscrewed the lure from the treble hook, leaving only the hook in Mr. O'Neal's earlobe and insisted on taking him to a doctor.

"Let's just fish this stretch of marsh first," he said.

No, I said, one of the few times I refused to do as he suggested.

After reluctantly agreeing to quit fishing, Mr. O'Neal declined to let me run the skiff, saying, "I'm used to running it."

Little wonder he wanted to handle the boat. Out on the open water, waves were 8 to 10 feet high. One second the skiff would mount the top of a comber giving us a spectacular view of the boiling sound. The next second the skiff would drop with a crash that felt as if it would drive our tail bones into our spines, and then we would be surrounded by green and white water before the skiff crawled up the next crest.

"You ever turned a boat over?" I shouted.

"No," Mr. O'Neal bellowed. "And I don't intend to start now."

We finally reached the hunting and fishing lodge and drove to Dr. Charles Wright's clinic in Jarvisburg. Dr. Wright sprayed Mr. O'Neal's ear with novocaine and removed the hook. "You're too old to be out there on that sound shoving a boat around," the doctor scolded. "You should retire."

"*Hrumphhh*," Mr. O'Neal grunted as he stomped out of the clinic. The next morning, he appeared at the hunting and fishing lodge, ready to guide again.

Mr. O'Neal was on close speaking terms with nature in other ways. Sometimes, he would say, "Get your rain gear on. We're going to a shower in a minute." You would wonder why he thought that. To you, the sky looked the same as it had all day. But soon rain always came.

Mr. O'Neal's knowledge was not restricted to hunting and fishing. Although he had only seven grades of formal schooling, he was well-read and could talk intelligently and interestingly on subjects ranging from politics to baseball, and he often quoted Shakespeare.

He was also an artist. He hand-carved handsome duck decoys and made his own "shoving oars," long wooden poles used to propel skiffs over the shallow sound. Fashioning the poles required hours of patient work. They had to be flat on the end that scraped the bottom of the sound and smooth on the other end so they would not blister the user's hands. His shoving oars were so well made they were much in demand by other watermen. He built his own skiffs, too, and they were among the most seaworthy on the sound.

When fishing was slow, Mr. O'Neal entertained his customers with stories. Once, when Jack Bilyeu and I fished with him, Jack's spinning rod bent.

"Get a strike?" I asked.

"Just grass," Jack answered.

"Don't ever say that!" Mr. O'Neal snapped. "Say it's the next best thing to a strike!"

That reminded him, he said, of the time a Currituck County store clerk told a customer the store did not have some item the customer wanted. Later, the store owner berated the clerk. Don't ever say we're out of anything a customer wants," Mr. O'Neal quoted the owner as saying. "Say we've got the next best thing to it!"

A few days later, according to Mr. O'Neal, a woman customer came into the store to buy toilet paper. "We don't have any," the clerk said. "But we have the next best thing to it."

Jack and I exploded with laughter.

After a long pause, Mr. O'Neal asked if we wanted to know what the clerk said "the next best thing to it" was? Yes, we said, we would like to know. "Sandpaper," Mr. O'Neal said without even a hint of a smile.

Mr. O'Neal had a child-like wonder about the sound. "Look at old Sol peeping up there with that red eye," he would say at sunrise. "Isn't that pretty?"

One morning, after the run across the sound, he gestured toward the marsh and said, "You're lucky to see that." Pinpoints of multicolored lights winked, sparkled and danced on the reeds. Mr. O'Neal explained that the rare and spectacular phenomenon was created by sunlight striking the dew on the marsh at just the right angle. Within a few minutes, the sun's rays slid across the marsh, and the lights went out.

Mr. O'Neal took great pride in his knowledge of the sound. Once, after we had fished a long stretch of water without catching a fish, I asked, "Mr. O'Neal, have you ever caught anything here?" "Wouldn't I be a damn fool to bring you where I had never caught a fish?" he snorted.

He was so knowledgeable about the sound that he was reluctant to admit the few mistakes he did make. Take, for example, the time he accidentally grounded his skiff. Despite its closeness to the ocean, Currituck has no lunar tide. But a nor'easter creates a "wind tide," driving much of the water into Albemarle Sound to the south as it had done that day.

"Isn't that a fishing lure?" Mr. O'Neal said, pointing toward a small object floating on the water some distance away.

"I don't think so," I answered.

Ignoring my remarks, he removed his shoes and socks, rolled up his pants, slipped over the side of the skiff, and slogged toward the object. He soon returned.

"You were right," he said, holding up a stick. "But now that I'm already in the water, I think I'll shove the skiff off this tussock."

He knew all along that the stick was not a lure. He just did not want to confess that he had misjudged how fast the water had dropped, stranding the skiff.

The first time I fished with him, he said yellow was the best color lure to use. I followed his advice and tied a yellow popping bug to my leader. On my second cast, I caught a nice bass. But Dick Byrd, my fishing partner, and I did not get another strike all morning. After lunch, just to have something to do, I replaced my yellow popper with a black one.

"They don't ever catch any fish down here on black," Mr. O'Neal grunted.

On my first cast, a bulge formed under the black popper, and the popper vanished, leaving only a depression where it once floated. A large bass, my bug in its mouth, vaulted from the water. The bass's gills flared red, and it shook its head angrily. The bass seemed to hang in the air a long time before crashing heavily back into the water.

Again and again, the fish jumped before I could work it close enough to the boat for Mr. O'Neal to scoop it up with his landing

net. He held up the fish, which weighed about 6 pounds, for me to admire. It glowed a beautiful silver in the early afternoon sunlight, and the water dripping from its body looked like beads of molten platinum. I was proud.

We fished on for about 15 minutes before Mr. O'Neal broke the silence. "I guess the reason they don't ever catch anything on black down here is that they don't ever use black," he said.

Mr. O'Neal loathed to praise you to your face, especially if he liked you. During the years I fished with him, he constantly found fault with my fishing skills—at least when I was with him. Yet after I returned home, he would tell Ed and Evelyn Barrett, who operated a hunting and fishing lodge on the sound, that I was a good fly rod fisherman.

Despite his reluctance to compliment me, he demonstrated his affection in many ways. He was forever making me something: a gadget to remove lures from fish that were hooked too deeply; something for my boat. Two fishing prints he gave me still decorate the walls of my den.

He also went to great lengths to see that I caught more bass than my fishing buddies. Take the day Greensboro's Paul Schenck was my fishing partner. When it came my time to move to the skiff's stern, Mr. O'Neal poled the boat backwards so I would still get the first casts at the best spots.

"That's okay," Paul whispered so that Mr. O'Neal could not hear. "It's obvious he's *your* guide."

My fishing buddies joked that Mr. O'Neal trapped bass for me to catch. He did not, of course. But he came close. When the water was so low that conventional guide skiffs could not get into the ponds where bass loved to congregate, he would tow a small skiff across the sound and anchor it the day before we were scheduled to fish. Then he would transport my partner and me across the sound in his regular skiff, transfer us to the smaller skiff, and pole into the ponds.

The first time he did that I was the only person in our party of eight who used a fly rod, an especially deadly method of catching bass on Currituck when the water was low. Consequently, I caught more bass than anybody else. When I told Mr. O'Neal that, he beamed like a proud father. But he did not congratulate me. Instead, he warned me again not to tell the others how he had been able to get into the ponds.

Mr. O'Neal took most of his hunting and fishing secrets to his grave. When he died, my wife's father was critically ill, and I did not want to be away from home overnight. But I knew I had to go to Currituck to say good-bye to Mr. O'Neal, a man who had added so much to my life. So I made the hard, 700-mile round trip drive to Currituck and back in one day to attend his funeral.

On the way home, I pulled to the side of the road to watch three deer in the lengthening shadows of the moss-bearded cypress trees on the edge of the Dismal Swamp. I fought back tears as I thought about never being able to fish with Mr. O'Neal again. But then I recalled a conversation he and Drew Lewis had years before. The memory eased the pain.

Lewis had joined one of our fishing parties at the invitation of Joe Kyle. I fished with Lewis one day. He seemed easy-going and good-natured and gave no hint of how stern he was to be years later in the air traffic controllers' strike. Mr. O'Neal liked him, and that was enough for me.

Lewis had a master's degree from Harvard and although still a young man, he was already successful. He was chairman of the board of Simplex Wire and Cable and president of Snelling and Snelling, the large employment agency. He later became a cabinet officer under President Reagan, and, after that, chief executive officer of the giant Union Pacific railroad holding company, and a director of many other major corporations.

The weather was perfect the day he and I fished together. The Indian Summer breeze was soft and warm. At lunch, Mr. O'Neal plunged his shoving pole into Currituck's sandy bottom and looped a line around it to tether the skiff. We munched sandwiches and sipped coffee while watching ducks and geese stream across the heavens.

"Mr. O'Neal, how long have you lived on Currituck?" Lewis asked.

"I've lived here all my life," Mr. O'Neal answered. I've farmed, commercial fished, tended crab and eel traps, and guided fishermen or duck hunters. Even when I was in the Coast Guard in World War I, I was stationed right across the sound and came home on weekends in my skiff."

Then the old fishing guide looked up at the diaphanous blue sky, and added, "And you know something, Mr. Lewis? If I had my whole life to live over again, I don't believe I would change a thing about it."

"That's the best definition of success I've ever heard," Drew Lewis said.

There was envy in his voice. ☐

Worms & Wood

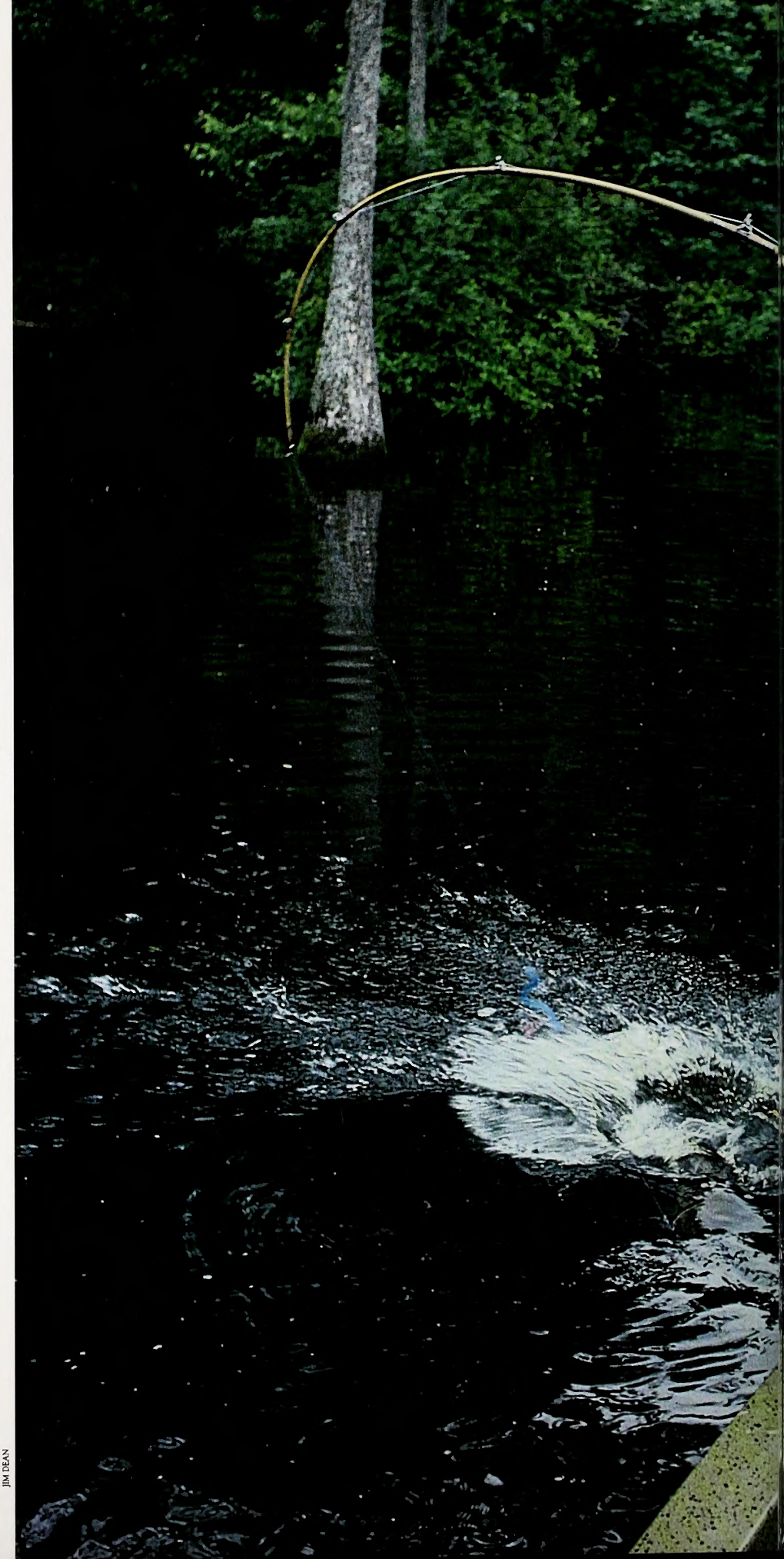
Plastic worms are great all-round lures for largemouth bass, but they work best when you fish them in the woodwork.

by Barry G. Davis ©1993

Like pork and beans or Abbott and Costello, some things just go together. For me, wet wood and plastic worms have proven to be a classic pair. Let me tell you why.

The kitchen-sized, deepwater pocket formed by the abrupt, 90-degree bend inside the creek mouth acted like a sieve to anything caught in the downstream flow. Limbs, logs, branches—and bait—were all pushed into this almost nondescript, well-oxygenated corner. Because only a limb here and a branch there marred the surface, most fishermen passed it by without a second look. Farther upcreek, structure was more visible, and that was where most tried their luck. Too bad.

My fishing partner, Flint Perry, and I had just been that route. Now, as the sun began to set, we had saved the best for last. Flint positioned the boat about 10 yards offshore of the



***Six pounds of** rambunctious largemouth bass tries to avoid an invitation to come aboard. In blackwater rivers like this one, and virtually everywhere else, one of the most successful ways to catch bass is by fishing soft plastic lures around submerged stumps, logs or other woody cover. Mike Gaddis hooked this bass on a plastic worm and released it.*

JIM DEAN

pocket, holding it in place against the current with judicious use of the trolling motor. As I fumbled around with a balky spool on one of my reels, he churned the edges with a white on silver, single-bladed spinnerbait. His dozen casts produced nary a bulge when, to be honest, we had expected some surface action.

Flint switched to a worm rod just as I made my first cast, flicking a Texas-rigged, tomato-colored worm as far back to the shoreline as it could drag the heavy line. Crawling it through the sunken structure, I let it climb and drop, bounce and bump almost at will. Halfway back to the boat, there was the telltale tap of a bass. My reflexes were just a hair on the slow side, and all I ended up with was a mangled worm wound around the hook bend. Flint eased his pumpkinseed curlytail over the same spot. He didn't miss the hook set.

The bass, maybe frustrated by the first miss, didn't tap the worm, but nailed it with a vengeance. Flint, wary of the treacherous maze of line-popping structure just below the surface, used as much pressure as his rod and line could bear to horse it out of the woodwork. The fight was brief, but nose to nose. The bass lost, and as Flint lipped it carefully for the release, we estimated the weight to be 7 pounds, give or take. That's close to bragging size for the rivers and creeks of the northeastern part of the state.

We quickly caught and released another pair of small bass from the same pocket, in addition to missing several others, as soft sunlight faded to dusk. We wrapped it up with a final 2 pounder, and had barely enough time to get back to the ramp before dark.

If you consider the amount of time and area actually fished, that nook of near invisible debris was a goldmine worthy of sworn secrecy. But success would have been marginal at best had it not been for worms.

The plastic worm, in all of its various configurations, is simply a deadly bait. (If you placed all of the styles, patterns, colors, lengths, thicknesses, tail shapes and buoyancies end to end, they'd probably stretch from Lake Norman to Currituck Sound!) Further, from a purely numerical point of view, worms are by far the most popular of bass baits. Deservedly so. In the past quarter century, they have arguably accounted for more bass in more varied habitat than anything else ever devised to fool ol' bucketmouth.

Bass fishermen, however, tend to become overwhelmed and distracted by the conglomeration of baits in their tackle boxes, be they hard, soft, or in-between. And keeping up with the newest stuff—lures touted by the "experts" as currently hot—can really add to the confusion. Sooner or later, though, common sense takes over. Hands-on experience yields confidence that certain baits and certain conditions go hand in hand. It may be a black Jitterbug gurgling the shoreline in the middle of night, a crankbait dug deep along a submerged grass line or a topwater minnow twitched in the shallows of a quiet cove at dawn. Whatever it is, it works and that's all that matters. That's how I feel about worms and wood.

Location has a lot to do with confidence. In addition to the easily accessible river systems that surround me in the northeastern part of the state, I also spend a lot of time fishing old millponds and beaver ponds. Each is littered with an intricate maze of waterlogged limbs, branches and slowly decaying tree trunks. Mother Nature does an efficient job of pruning the trees surrounding these ponds each winter, so the structure is constantly being replenished and constantly changing. We're talking about more than simple stick-ups. Like the creek pocket mentioned above, what you see on the surface is minimal. The *real* woodwork is below.

However, that doesn't mean you should discount surface possibilities. During spring, summer and early fall, when weather conditions cooperate, you can steadily pick away at bass along the shaded, cluttered shoreline banks with a topwater worming technique.

It's the simplest tackle setup in bass fishing: a 6- to 8-inch floating worm rigged weedless and weightless on medium-weight spinning gear. (Controlling the spool on bait casting gear is difficult with the light weight of the worm rig. And it's almost impossible if you need to skip the worm under overhanging cover.). Line testing 12 to 14 pounds walks the middle road between too light for the structure and too heavy for the bait. Hooks need to be light enough not to inhibit the worm's action. I like a 3/0 thin-wire, straight-shank hook.

As for the worm itself, conditions dictate choices. I'd rather fish a curlytail worm than a paddle or straight tail because of the added action. I also prefer a thicker worm to a thin one because of the buoyancy. Finally, I like longer worms because of the larger profile. But that's all subject to change. As are colors.

Generally speaking, the brighter colors have worked best for me in most situations. However, if they're not producing, I change. I've switched from hot pink to watermelon to moccasin to black in the space of a few minutes, looking for the right combination on a given day.

The technique you use for this shoreline surface fishing is as simple as the rigging. The worm is cast to the target area around any visible structure or where experience suggests there is submerged structure along the shoreline. I retrieve with steady, short, flick-of-the-wrist twitches. If the worm's buoyancy and hook are properly balanced, it'll stay flat on the surface, and dart a few inches side to side. Strikes are rarely subtle.

In good water, it's not unusual to hook 20 or more bass in a few hours, but most will be small fish. The bigger bass live almost totally secure within the deeper sanctuary of the sunken limbs. To play with them, you have to get a bait down into the woodwork. And nothing, not even a jig and pork combo, can slide through the obstructions better than a Texas-rigged worm.

EUGENE HESTER

***Worms or other** soft plastic lures that have tails with a molded-in curl or ripple are favored because they have an enticing action. The author retrieves slowly, crawling the worm over submerged limbs, letting it climb and drop, so that the tail flutters each time the worm sinks.*

EUGENE HESTER

Because some of the best *bass cover isn't visible on the surface, it will pay fishermen to seek out submerged trees, stumps or log jams where cover might have gone unnoticed by other anglers. William Hester hooked this fat bass on a worm in submerged cover.*

By necessity, tackle has to be on the heavy side. When you hook up, the battle is usually an abrupt, straight line tug-of-war. Either you winch the bass out before it turns, or you lose. Line pops like an overstretched rubber band if a bass wraps it around a limb or branch.

Flipping is generally considered the premier technique in and around thick cover like emergent willows, but I find it to be less than ideal on submerged logs and limbs because you can't really see exactly where you're flipping to. Casting with a heavy action worming rod makes more sense. It's a bit overpowering for small bass, but it pays dividends with bigger fish. The critical element is line strength. Any premium line testing 20 pounds should do the trick. Most of the time, that is. In really nasty structure, 30-pound test may not be out of the question; however, you tend to lose touch with the bait when you get above 20, so that's what I generally use.

A very slow, crawling retrieve seems to work best. Hopping the worm, as you would in more open water, doesn't give it a chance to find the tight spots. Let it crawl, slip and slide, climb and drop, as you snake it along, and it will settle into places that are unreachable any other way. One of the keys is to be on guard from the moment the worm hits the water until it's back at your rod tip. At least half of the strikes will come on the drop, especially after the bait climbs a log or limb and settles slowly back into a branch-framed hole or slot or pocket on the other side. For that reason worms that have some flotation work best. To further enhance the bait's slow, tantalizing drop, use the lightest worm weight possible. I like 1/16- or 1/8-ounce weights. I stay with 3/0 hooks, but not the thin-wire variety. You want a bit more steel when a hook-up comes. I like worms 6 to 8 inches long. Anything longer has a habit of clinging in thick branch clusters, while anything shorter may produce fewer strikes.

Like topwater worming, colors can rattle your sanity if you let them. What works in one body of water at one specific time may not get a sniff someplace else. Most of the water I fish is stained to some degree by cypress, cedars, decaying vegetation or runoff. Therefore, I'll usually start with the old reliable dark colors like black and motor oil, followed by something with more contrast like tequila shad, tomato and pumpkinseed.

On those occasions when *nothing* seems to work, I won't hesitate trying a color that's completely off the wall. Call it curiosity or uncontrollable boredom, but I'll give anything a shot: fluorescent orange, neon chartreuse, white with black spots. You name it, I'll try it. Most of the time, it's nothing more than an exercise in futility on a day when the bass simply aren't interested. But, every once in a while, that offbeat color will produce. If you happen to be spinning your wheels with your most reliable colors, try something very different. You won't do any worse, and you may just hit upon the terror worm of the moment. My biggest North Carolina woodwork bass fell prey to a bubble gum bullfrog worm. That bass had ignored an entire spectrum of common-sense colors that had been worked through its dilapidated log home, but the sudden appearance of a hot pink worm with a funny tail struck some strange chord that triggered it to hit. And the strike was solid; no hesitant tap-tap. Truthfully, I don't know who was more surprised, me or the bass. But I knew who was most pleased.

This brings up another point. Don't give up on a pile of submerged woodwork too quickly. Probe it meticulously, then try it again from another angle. Bass in the thickest structure often aren't very active because there's usually plenty of forage around. Still, relentlessly bumping and banging the worm on their rooftop and doorstep may gain their attention.

Finding these spots of reliable submerged cover takes some searching. The best are in ponds or small lakes surrounded by woods. Bigger lakes, rivers and creeks also have pockets of it, especially in primary tributaries because of the constant, and sometimes heavy, current flow. Look for places where the current can push the logs and limbs into a dead-end cove or against the up-current side of a shallow point. Don't expect to see much on the surface, but don't cross a spot off until you work a worm into it. If it feels right, then mentally mark the location, and fish it hard every time you go.

Bass, particularly mature bass, are like termites in their love for wood. It offers them the best of all worlds—safety, comfort and a forage supply that is drawn to it for the very same reason they are. By probing these spots, you'll soon see why worms and wood go together like biscuits and red-eye gravy. ☐

Summertime Surf Fishing

The gentle summer surf yields a variety of pleasures for vacationing anglers who know the simple tactics that work best.

written and photographed by Joe Malat ©1993

Many vacationers don't realize that good fishing often exists in the surf even on busy beaches throughout the summer. It's simple to add fresh fish to your menu if you watch the tides, fish early and late in the day, and choose the right bait or lure for the species that are most likely to be feeding in the shorebreak or slough.

"Was that a fish?" I muttered out loud, speaking to no one, but asking for confirmation. "There, there, I saw it again!" This time I was certain as I strained my eyes to look deeper into the clear water than my Polaroids would allow. This time I was sure. A small school of pompano moved in along the edge of a sandbar not more than 20 feet away, and I could see their silver-gold sides flash as they rooted in the sand for mole crabs.

My fresh shrimp was inhaled as soon as the short cast hit the water. The pompano hooked itself, and immediately ran 10 yards down the beach, using its wide body for leverage. The 8-pound monofilament made a hissing sound as it sliced the water, but in less than a minute the fish was flopping on the beach at my feet.

"All right! Let's do it again!" I said aloud as I tossed the fish into my cooler.

I picked three more fish out of the school before it moved off the beach with the falling tide. All were very nice pompano between 3/4 and 1 pound—perfect for dinner, and a thrill to catch on a light, one-handed spinning rod. Not a bad catch for an hour of surf fishing on a hot July morning, and this was supposed to be the "slow" season for surf fishing.

Spot, croakers, sea mullet, small bluefish, pompano, speckled trout and Spanish mackerel are regulars in the summer surf on the beaches I fish from Kitty Hawk to Ocracoke, but they're also common on our beaches to the south. Some are easier to catch than others, but to be constantly successful with each you may need to adopt a few tactics that may not be necessary at other times of the year.

There are exceptions to every rule, but there are fish that prefer to feed in dirty, murky water, and those that come into the surf only when the water is clear. Spot, croakers and sea mullet are bottom feeders that travel in large schools, and they move in close to shore when the water is dirty. These are not predatory fish but are often the prey for king mackerel, bluefish and other toothy critters. Dingy water makes these fish a less visible target, and it allows them to move into the surf zone to feed on worms and other bottom-dwelling animals. Dirty water also usually accompanies conditions that stir up more food for these fish.

It's rare to catch spot, croakers or sea mullet on a lure. Bottom fishing with fresh, natural bait is the ticket. Small pieces of bloodworms, shrimp, squid and mullet should be fished on small hooks and two drop-bottom rigs. I like the long shank hooks snelled with a small spinner blade and a few fluorescent beads on the leader, usually size No. 2 to No. 6, bronze finish. If in doubt, lean toward the smaller 5 or 6 sizes. Use only enough weight to hold your rig on the bottom. In many cases, an ounce is enough. Too much lead makes it tough to feel the bites from these sometimes gentle nibblers.

The summer sun can bake a bloodworm or a piece of squid in short order, and it's a good idea to keep your bait—and especially your catch—on ice in a cooler.

Fish feed by sight and smell, and these

***Pompano are among** the best-eating of all ocean panfish, and they are especially common from summer through early fall. These small fish run in schools and often feed practically at your feet under the shorebreak. Larger pompano, a pound or so, are more likely to feed along the outside sandbar. Soft mole crabs or very fresh shrimp are good baits.*

ocean panfish like the freshest possible meal. A dried up, rotten piece of bait will not get many takers.

Surf and water conditions can improve or deteriorate rapidly with the change in velocity and direction of the wind. Chocolate brown water may clear overnight, or with a tide change, and the bottom feeders that prefer murky water may move farther offshore, out of the range of surf anglers.

Yet, change can breed opportunity. The appearance of clear water is a welcome sight for surfcasters who fish for bluefish, pompano, Spanish mackerel or speckled trout. All can be aggressive predators, and they prefer to feed when the water is clear. However, each may require a special technique, lure or bait.

Spanish mackerel are almost always caught on lures, particularly from the surf. They feed on small minnows, mullets or other baitfish, and artificials that replicate such prey will catch fish. Stingsilvers, Kastmasters and small Hopkins in a chrome, gold or pink finish, are favored local lures. Spanish have keen eyesight and are very leader-shy, but they also have a mouthful of sharp teeth. Rather than use wire headers, surfcasters will tie their line directly to the lures intended for the macks, and risk the occasional bite-off to be able to get the strikes. The fast-swimming Spanish are usually fooled by a lure with a quick retrieve.

Frequently, bluefish may be mixed in with feeding Spanish mackerel and will hit the same lures. If the folks around you are catching mackerel, but you are pulling in bluefish with the same lure, it's a good chance your retrieve is too slow. Summertime bluefish are much smaller than their relatives that appear during the spring and fall, usually weighing less than 1 pound, but they are fun to catch.

In addition to bright-colored metal lures, blues readily bite bottom hooks baited with pieces of fresh, cut mullet or spot. A two-hook "fireball rig" is deadly for the small choppers. Fireballs are bottom rigs with small, brightly painted floats in front of each hook. The floats keep the bait moving and off the bottom and keep it clear of some of the scavenging crabs.

Speckled trout are not abundant in the summer surf, but they can make an appearance. Ideal conditions are clear water and a fairly calm surf. The best times are dawn and dusk. Artificial lures such as lead-head jigs with soft plastic tails and small bucktails are good for specks in the summer. MirrOlures can be good, but are usually more effective in the fall when the trout are larger.

I love to fish the summer surf when the morning sun is just cracking the horizon. It's simply the best time of the day. Frequently, there's a brief period on those hot summer days when the fish go crazy at first light, then quickly disappear when the sun starts to climb and the swimmers hit the beach. This can be true for the trout, mackerel and bluefish.

Pompano are a warm-water fish found in the Outer Banks surf only during the summer, usually from late June through mid-September, or until the water temperature cools enough to chase them back down the coast. Late summer is particularly good.

Pompano cruise along shoals, sand bars and the surf line, feeding on worms and mole crabs. Mole crabs are small crustaceans that live in the sand between the high and low tide marks. Called "sand fleas" by locals, mole crabs are an excellent bait for pompano, and the price is right. You can usually dig all you

need right at your feet. Keep them alive in a bucket of damp (not wet) sand. Soft-shelled sand fleas are prime baits, almost sure to bring a strike from a pompano. Sand fleas grow by shedding their hard shell exposing a new, larger shell that is soft but will harden in a few hours. When you dig the soft ones, you catch them before their shell hardens. Fresh, not frozen, shrimp is also an excellent pompano bait, but be sure it's absolutely fresh and don't let it spoil.

As you might expect, summer surf conditions are much different from those you encounter in the spring and fall. Generally, the ocean is calmer, the surf gentler. Heavy rods and reels aren't needed. I have two outfits that will cover all of the bases. My favorite is a 7-foot, graphite spinning rod, rated to cast up to 1 ounce, and it's mated to a light, saltwater spinning reel filled with top-quality 8-pound monofilament line. It's a perfect rod for casting a light lure, or bottom fishing with a small weight. Any fish, no matter what size, is fun to catch on this outfit.

A slightly heavier, 9-foot graphite rod, medium spinning reel, and 12-pound mono works fine when casting a bottom rig to the outer bar to intercept a cruising pompano. I have a spare spool for this reel filled with 10-pound line for throwing Stingsilver lures to bluefish or Spanish mackerel when I need the long rod for added distance. Light lures will cast farther with a thinner line. My 9-foot rod can easily handle up to 3 ounces of weight. Of the two rods, I probably would use the 7-footer most of the time.

During the summer, you will catch a fair number of small fish, because that's what is there. The trophies arrive with cooler weather in the fall. Bluefish, trout, red drum and flounder are all protected by a minimum length, and it is illegal to have undersized fish of these species in your possession. There are no minimums for spot, croakers and sea mullet, but your catch may include fish that are simply too small to keep. By the time they are filleted or cleaned, there's not enough meat there to eat.

No matter what the species, if you can't use them, carefully release them. Don't send them sailing and skipping across the surface. Gently lay the fish in the water, and let it swim out of your hand. A little care for our fish stocks today will go a long way to guaranteeing fish for us to catch in the summers ahead.

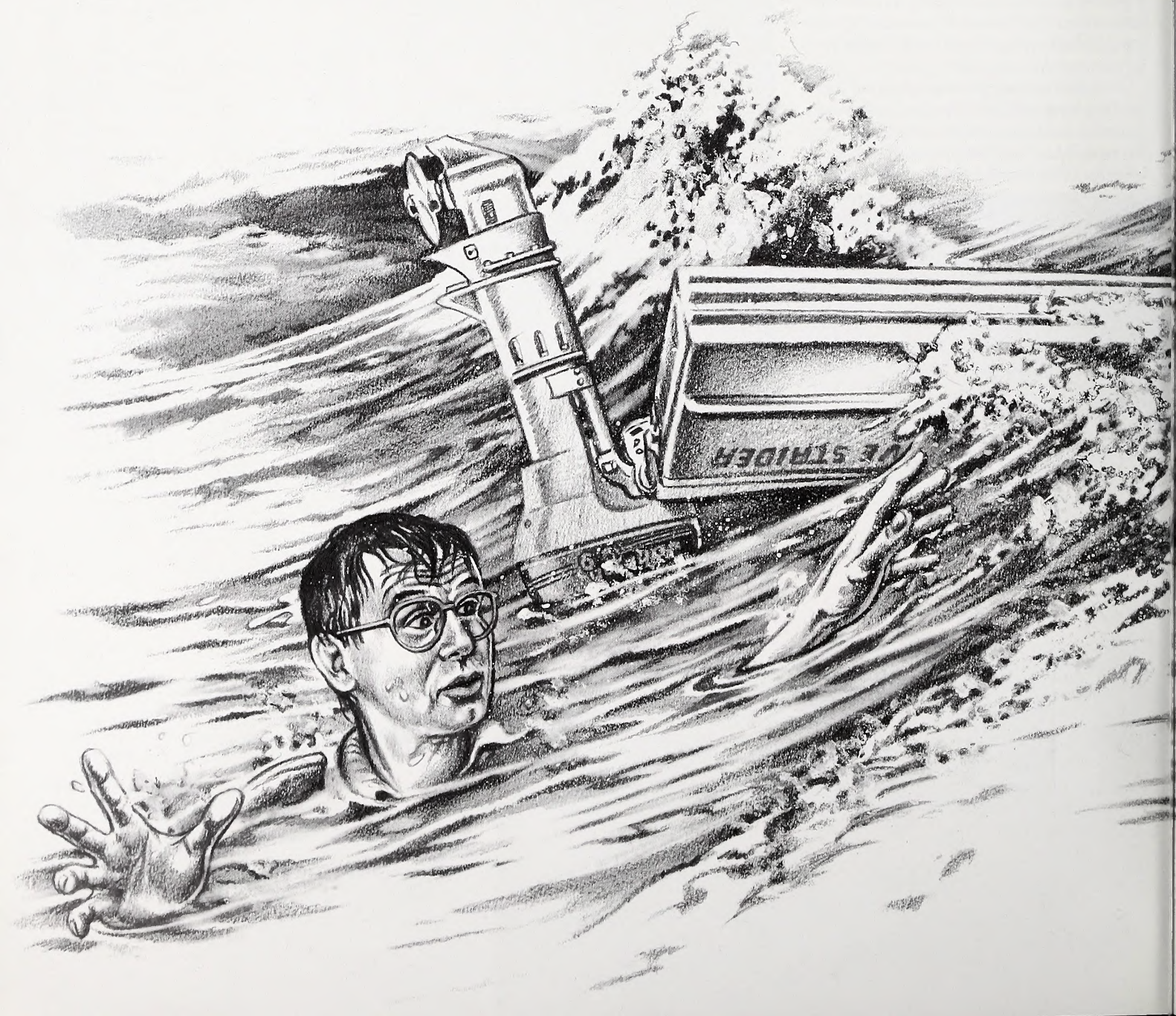
Meanwhile, be sure you've got your light tackle for the family vacation. Summer surf fishing offers lots of rewards. ⊡

During the summer, *surf fishing is often at its best for an hour or so right after sunrise and again at dusk, especially if favorable tides coincide. It's also the best time to angle for a bit of welcome solitude.*

Trouble at Shackleford

There was no excuse for ignoring that wind sock, or failing to wear life jackets. But we did, and we nearly paid with our lives.

written by Bill Yoder ©1993
illustrated by Jim Brown ©1993



Sitting on the deck of the beach cabin—relaxing at last after six long hours in the car—I rejoiced in the smell of the salt air and the sound of the churning surf. I suppose I felt the breeze, as well, but the wind was more evident in wild gyrations of a nearby wind sock, a sock so buffeted that it looked as though it would rip loose and fly away.

Oh, how I wish I had paid more attention to that wind sock. It was a literal red flag to dangers ahead.

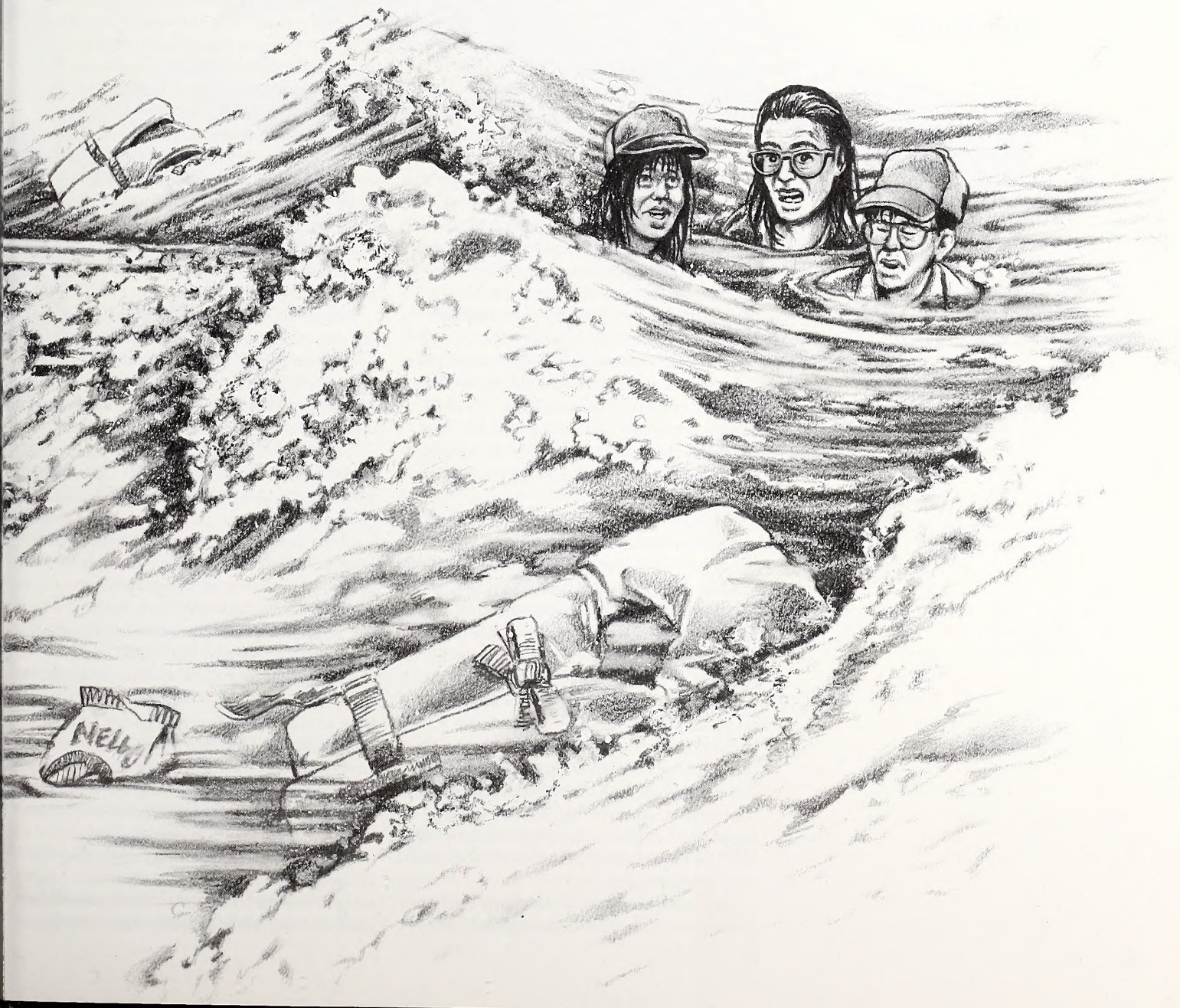
If you happen to be a regular reader of *Wildlife in North Carolina*, you may have read an article in the June 1988 issue entitled "Can I Go, Daddy." It was an article I wrote about my children's first experience fishing in the broad, shallow waters of Bogue Sound. Every year since, we've gone to the same beach (Emerald Isle) and the same beach cottage where we've reveled in exploring the rich world of the sound from our johnboat. We've fished; we've caught crabs; we've netted shrimp and mud minnows; and we've played on the myriad sandbars and islands that dot this backwater sanctuary.

A couple of years ago, we extended our travels to include nearby Back Sound, Shackleford Banks and Cape Lookout. If you're not familiar with this area, look at any map of the North Carolina coast and find the crook of the elbow—the place where the north-south shoreline suddenly takes a turn and runs east-west. That "crook" is Cape Lookout; the first east-west island is Shackleford Banks.

The only way to get to Shackleford Banks is by boat—which means most people don't get there at all. There are wild ponies on the island. Shelling is bountiful and it's not uncommon to pick up whole, flawless whelks. The beach, in many places, is protected by off-shore sandbars, sandbars that diffuse the waves, so the surf doesn't usually crash the beach here as it does elsewhere. The placid waters—so clear that you can see your toes while standing in water waist deep—roll in gently, barely creating a splash. And right across inlet is picturesque Cape Lookout Lighthouse, painted in its distinctive diamond pattern. These are some of the many magic ingredients that get us talking excitedly about this excursion weeks before actual departure.

To get to the east end of Shackleford Banks, you need to launch from Harkers Island. This year when we began our boating journey it was readily apparent that we were in for a rough ride. We were riding with a falling tide, and against a tenacious southwest wind. I briefly considered calling off the trip at that moment but, regrettably, shrugged off those concerns and forged ahead.

It was a rough crossing, but uneventful. Much to our disappointment, though, once



"The broad, flat nose of the johnboat dug into the wall of water like a snow shovel, instantly submerged under the rush of water."

we reached the island, we found that a lot of the charm we had known in years gone by was not there this year. Thanks to the wind and the high waters of tides brought on by a full moon, the beaches were littered with man-made and natural debris dredged up from the ocean. We happened to get there at nearly low-tide, which only accentuated the junk-yard look of the beach. And the normally docile surf was churning, making swimming and wading unpleasant.

The one highlight was the discovery of the remains of a large sea turtle that had washed ashore. We got to see it up close and marvel at its size. We were also able to report the sighting to a patrolling state wildlife officer a little later.

We departed early and headed across Barden Inlet to Cape Lookout to see if conditions were any better. The beach there was gorgeous to look at, but the sand was blowing so hard that it stung our legs and sent us scurrying back to the boat. We gave up. This outing was not turning out to be one of our better ones. Little did we know that, in just a few minutes, the excursion was to take a disastrous turn for the worse.

Heading back to Harkers Island, we were traveling with the wind which made the return trip much more pleasant. Though we were still bucking the falling tide, the ride was still much smoother than the first leg of the trip. The only problem was that the water had become so shallow in places that we had to walk and pull the boat along. That's no problem in a flat-bottom johnboat. In fact, for us, in the heat of the day it's a welcome excuse to jump out and get wet.

Once past the last shallow spot, we all piled in and started the short boat ride home. The "we" included my 9-year-old son, David; 11-year-old daughter, Lauren; my 29-plus-year-old sister, Frances; and me. Everything was normal—exceptionally normal, it seems in hindsight.

Taking aim at the channel markers, I was unaware at first of what was happening. But in a flash—too late—I knew we were in trouble. The familiar, if bothersome, chop of the water turned to deep swells. In an instant, we were in rolling seas as formidable as those in the ocean. The trough between waves was deep. We survived the first wave. The second wave was steeper, and there was no surviving it.

The broad, flat nose of the johnboat dug into the wall of water like a snow shovel, instantly submerged under the crush of water. The stern in turn rose up, exposing the broad, flat bottom to the relentless tail wind. We flipped and rolled so fast that I never had time to kill the engine.

Beneath the surface of the churning water, I remembered the battered wind sock. If only for an instant, it flashed in front of my eyes and I wished I had paid more attention to it. Then I thought frantically of the others. Like me, they weren't wearing life preservers.

Boaters may well scream in disbelief at this point: "How could he take his family out without life preservers?" It was inexcusable, and there's nothing more to say about it. There is no excuse. Normally we wear them. But today, the water had been so shallow that we were walking as much as we were riding. And it was easy to forget to put on life jackets when the water was only up to our knees.

I had been sitting at the back maneuvering the tiller to steer when the boat flipped. It rolled over on top of me with the motor still running and the propeller still engaged. My first thought of survival under water was to stay clear of the slicing propeller blade, wherever it was. I soon recognized by touch—and then grasped—the inverted motor head, which was now on top of me, and tried to throw the boat and motor away from me. Unfortunately, I was disoriented and was trying to throw it into the wind and the current. Again and again the boat came back down, keeping me pinned. I became more disoriented. I could no longer tell which way was up and which way was down. And my lungs were screaming for air. Finally, I kicked hard in a direction that I thought was down (and away from the boat), then set out to find the surface. It worked. After swimming for what seemed like an eternity I came to the top coughing and spitting—and looking frantically for the others.

When my eyes finally cleared, all I could see were waves and the partially submerged, upside-down boat. Lauren, David and Frances were nowhere in sight. Fighting panic I yelled out. Some of the sweetest words I'll ever hear were "We're over here."

The three of them had been riding forward in the boat and had been thrown clear. They were dazed and scared, but Frances had been able to gather up the children and herd them back to the boat. I made my way around the boat, which was being pushed along at surprising speed by the wind and the rushing current. No one appeared to be hurt.

"What now?" we wondered collectively.

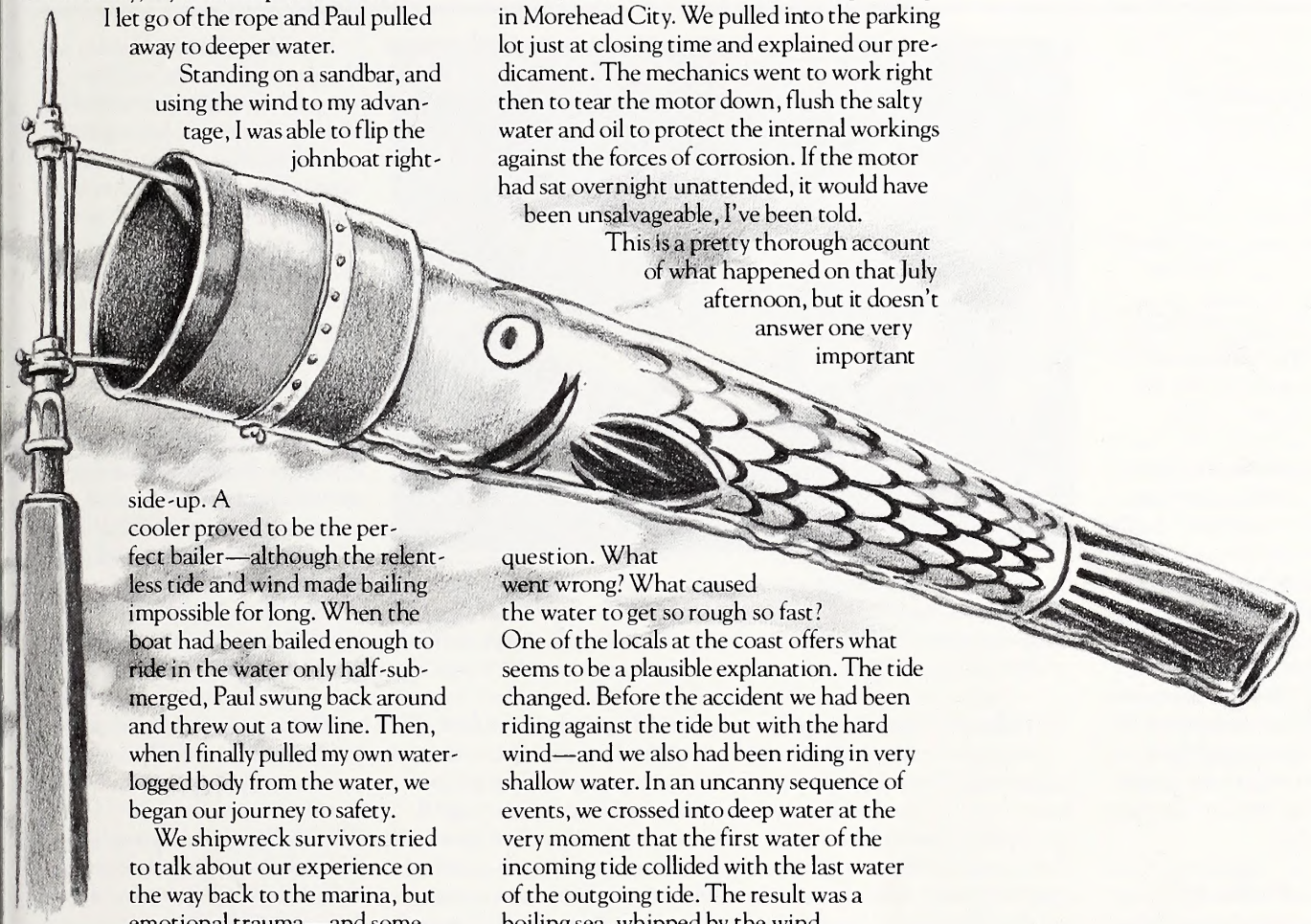
Fortunately for us, "Paul" and "Maryanne"—whose last name we failed to get in the confusing aftermath of the accident—were nearby and had seen us go down. They immediately swung their boat around and positioned it in the turbulent water to help us. It was no easy task, considering the wind, the current and the shallow waters we were about to drift into once beyond the channel.

Maryanne threw out a line, while Paul struggled to keep his boat steady. There was no time to attach the line to the capsized boat since we were drifting rapidly out of the chan-

nel. I held onto a cleat on the front of my boat with one hand and the rope with the other, providing a human link for the others to scramble aboard the rescue vessel.

At the very moment David, the last one in the water with me, began to climb the ladder to safety, my feet scraped the bottom. I let go of the rope and Paul pulled away to deeper water.

Standing on a sandbar, and using the wind to my advantage, I was able to flip the johnboat right-side-up. A cooler proved to be the perfect bailer—although the relentless tide and wind made bailing impossible for long. When the boat had been bailed enough to ride in the water only half-submerged, Paul swung back around and threw out a tow line. Then, when I finally pulled my own waterlogged body from the water, we began our journey to safety.



We shipwreck survivors tried to talk about our experience on the way back to the marina, but emotional trauma—and some nausea made it impossible for us to do much more than huddle and shudder. Shudder from the wind on our exposed, wet bodies. And shudder from the realization of what might have been. We had survived. But only by the grace of God.

That's the end of the drama. But it's not the end of the story. Compared to the human losses we might have suffered, all others pale by comparison. Still, there were losses. We lost an inner tube we had been playing on, the anchor, the boat tie-down strap, a cast net, and snacks from the cooler. We lost all the pretty shells we had collected at Shackleford Banks.

Amazingly, none of the three glasses wearers lost their glasses, although it's a mystery as to why not. (In fact, two of the three hat wearers came up with their hats still on.) Just as surprisingly, we did not lose any keys or wallets. Several years ago I had bolted a discarded military ammo box to the side of the middle seat of the boat. It's a handy, dry repository for glasses, keys, money and other items on normal outings. Usually, however, we fail to close it. On this date, as fate would have it, Frances had slammed it shut the last time she had reached in, unknowingly sparing us from lots of further trauma.

The once-submerged boat motor survived as well, thanks to the fast work at a repair shop in Morehead City. We pulled into the parking lot just at closing time and explained our predicament. The mechanics went to work right then to tear the motor down, flush the salty water and oil to protect the internal workings against the forces of corrosion. If the motor had sat overnight unattended, it would have been unsalvageable, I've been told.

This is a pretty thorough account of what happened on that July afternoon, but it doesn't answer one very important question. What went wrong? What caused the water to get so rough so fast? One of the locals at the coast offers what seems to be a plausible explanation. The tide changed. Before the accident we had been riding against the tide but with the hard wind—and we also had been riding in very shallow water. In an uncanny sequence of events, we crossed into deep water at the very moment that the first water of the incoming tide collided with the last water of the outgoing tide. The result was a boiling sea, whipped by the wind.

I don't know enough about the tides to say if this is actually what happened, but even if that's the immediate cause, it still leaves me asking what danger signal I missed that I should have picked up on. I have been in the sound dozens of times over the years—at high tide, low tide and changing tide—and have never experienced difficulty like this.

The warning signal, of course, was the battered wind sock. I have learned a very dangerous lesson about the effects of the wind on water in general, and on the tides in particular. The wind is not just an irritant; it is a potent force that can kill the unsuspecting boater.

All in all, we came away remarkably unscratched. Things very well could have turned out quite differently, we all know. But they didn't, and now we're left to count our many blessings and contemplate with renewed respect the awesome, wondrous forces of nature that lured us—and nearly swept us away. ☐

Artist Paints Federal Duck Stamp, Too

New State Waterfowl Stamp and Print Available

Written and Edited by Vic Venters

North Carolina collectors of the state waterfowl stamps and prints have good news for 1993-94 because painter Bruce Miller was chosen for both the North Carolina stamp and print series and the federal 1993-94 migratory waterfowl stamp.

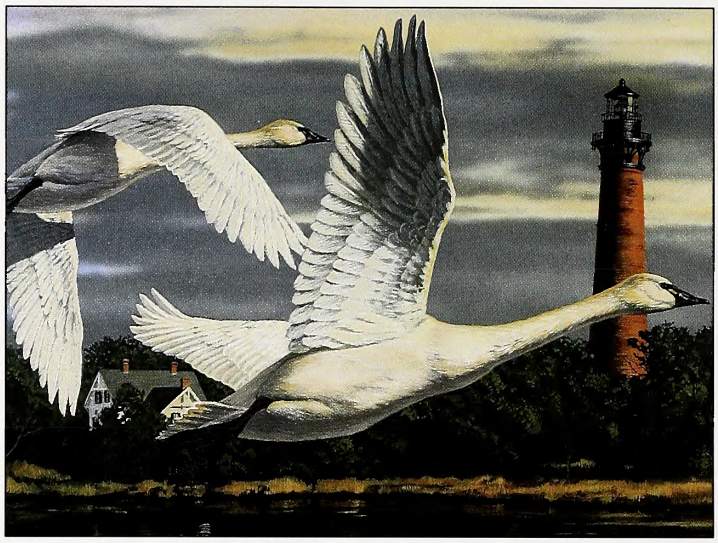
The 11th edition of the North Carolina waterfowl stamp features Miller's painting of a pair of tundra swans with the Corolla Lighthouse in the background. His painting of two canvasback ducks has been selected for the federal duck stamp.

This is the fifth consecutive year the N.C. Wildlife Resources Commission has chosen one of the state's seven coastal lighthouses to accompany the waterfowl species featured on the state stamp and print.

The Corolla Lighthouse is the most northern of the lighthouses in the state. It is located in Currituck County about 25 miles north of Nags Head.

The stamp and print series for the past decade has been received favorably by sportsmen and collectors. In some cases, stamps and prints have been very profitable. The first-of-state stamp, issued in 1983 at $5.50, now commands as much as $95, while the print and stamp combination for that first year sells on the secondary market for $550 to $900.

"We are really excited about this year's stamp-print program," said Sidney Baynes, chief of the Division of Conservation Education. "The continuing lighthouse series has been very popular with print and stamp collectors. The combination of another beautiful lighthouse painted by the reigning federal duck stamp artist should make for continuation of a really successful program."



***Bruce Miller's painting** of a pair of tundra swans flying in front of the Corolla lighthouse was picked for the 1993-94 North Carolina duck stamp and print. Miller is also the artist for this year's federal duck stamp.*

Baynes said published reports indicate the North Carolina stamp and print program is among the top three in the nation and that North Carolina prints and stamps are widely sought throughout the country.

The Wildlife Resources Commission began the waterfowl stamp and print program to raise funds for waterfowl conservation, including acquiring and improving habitat. Purchase of the stamp was voluntary until 1987 when it became mandatory for waterfowl hunters to possess the stamp.

Monies from the sales of stamps and prints go into the Commission's Waterfowl Fund. Since inception of the program, more than $2.4 million has been raised. These funds aided in the purchase and habitat improvement of Conine Island in Bertie County, Hunting Creek Swamp in Davie County and White Oak Impoundment in Onslow County. Funds also aid in goose research, equipment purchases and in meeting the Commission's financial obligation to the North American Waterfowl Management Plan, the international program aimed at helping restore waterfowl populations in North America.

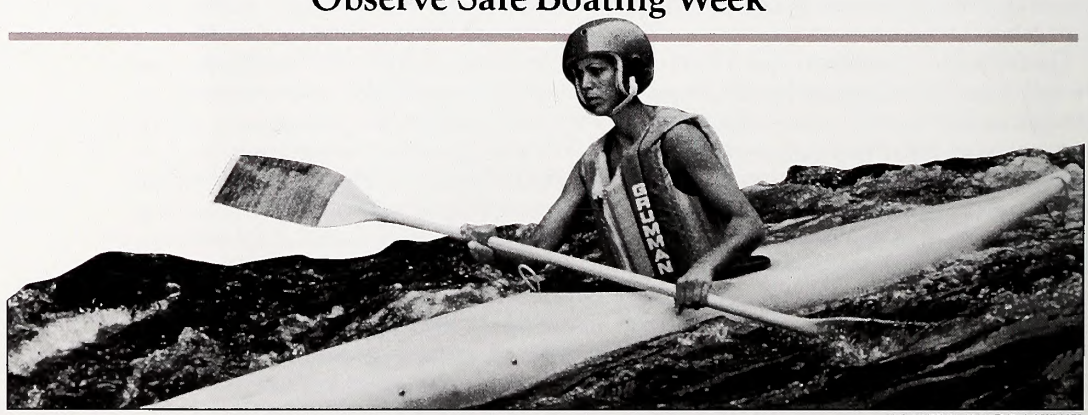
State waterfowl stamps will be available on July 1 from licensing agents for $5 each. The stamp and print series may be ordered now from independent art dealers. Retail price is $141.

For more information, contact the license division, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188, or telephone (919) 662-4377.

—Bodie McDowell

Slated for June

Observe Safe Boating Week



N.C. MUSEUM OF NATURAL SCIENCES

***National Safe Boating Week** will be observed June 6-12 this year. Boaters are strongly encouraged to wear personal flotation devices (PFDs) at all times. Over 80 percent of boating-related fatalities involve people not wearing personal flotation devices; but, tragically, 85 percent of them had PFDs aboard. Wearing a PFD, obeying all boating regulations, and avoiding alcohol will reduce fatalities from boating accidents.*

Students Stress Conservation Themes

Regional Science Fair Award Winners Announced

You don't have to look any farther than regional science fairs to see that many North Carolina school students are already devoting time to helping solve some of the serious problems facing the environment today. Some of the projects at this year's eight regional science fairs dealt with topics such as oil and water pollution, endangered species, wildlife conservation and biology.

To encourage such projects, the N.C. Wildlife Resources Commission's Division of Conservation Education and the N.C. Wildlife Federation sponsor Natural Resources Conservation Science Fair Projects.

These regional science fair awards are presented to North Carolina students whose science projects recognize the importance of natural resources conservation through interesting, innovative and educational activities and conclusions.

The projects are judged at each of the state's regional science fairs each year. Award winners are selected by Wildlife Commission and Wildlife Federation personnel.

Science fairs are exhibitions of scientific projects prepared and presented by students under the guidance of their teachers and with the help of other persons interested in the science topic being explored. The fairs are sponsored and coordinated by the N.C. Association of Science Teachers.

In every region, Junior and Senior awards consisting of a cash prize and a plaque are presented to winners. If a region has an Elementary level competition, a Merit award is presented to the Elementary level winner.

However, if the region does not have an Elementary level competition, then the Merit award may go to either a Junior or Senior runner-up. Only one Senior award, one Junior and one Merit award are presented in each of the eight regions for a total of three awards per region.

Prizes are as follows: Senior Division (grades 9-12) $100 and plaque; Junior Division (grades 7-8) $50 and plaque; Merit award (grades 4-12) plaque.

The following students won regional science fair awards for 1992-93:

Region 1 Senior Division: Prateeti Prabhaker Khazanie of J. H. Rose High School for "Eureka! An Automated Method of Oil Spill Cleanup."

Region 1 Junior Division: Jeremy Shisler of Cape Hatteras School for "When are Crab Larvae Most Common in the Pamlico Sound?"

Region 1 Merit Award: Roy Alton (Trey) Peaden IIII of Farmville Middle School for "Is there a Variance of O2 Levels in Pitt County's Water?"

Region 2 Senior Division: Lucas Medlin of John T. Hoggard High School for "Pollution Levels in and around Marinas in Myrtle Grove Sound."

Region 2 Junior Division: Jandi Willis of Gramercy Christian School for "Which Pollutes Most, Ducks or Septic Tanks?"

Region 2 Merit Award: Catalina Hooper of East Carteret High School for "Which Type of Oyster Grows the Fastest."

Region 3 Senior Division: Kalpana Kasala of N.C. School of Math and Science for "The Effects of Ultraviolet Light on the Embryonic Development of Medaka Fish."

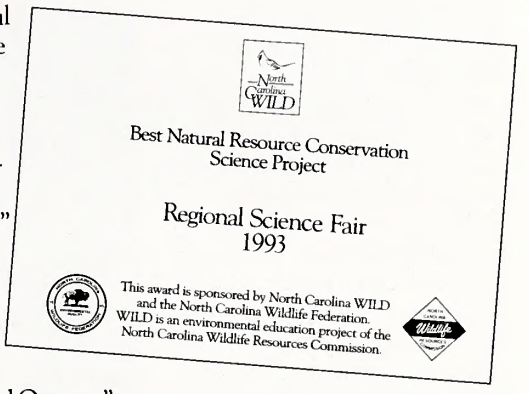
Region 3 Junior Division: Ryan Alexander of Rocky Mount Academy for "White-tailed Deer of N.C.—Southeastern Halifax County."

Region 3 Elementary Award: Sutton Barbrey of Lynn Road School for "Save the Bald Eagle."

Region 4 Senior Division: Susan Williams of Pinecrest High School for "Harmful Pathogens in Moore County Creeks."

Region 4 Junior Division: Debbie Dearborn of Southeastern Academy for "Beach Erosion."

Region 4 Elementary Award: Amy Autry of Stedman Elementary School for "Troubled Oceans."



Region 5 Senior Division: Kelli Marge Williams of Person High School for "Can Fish Live in Person County Water?"

Region 5 Junior Division: Christie Hayes of Kiser School for "Liquid Lifeline."

Region 5 Merit Award: Mark Chambers of Draper Elementary for "Robotics in Recycling."

Region 6 Senior Division: Jennifer Thornton of East Mecklenburg High School for "Muscle Mania."

Region 6 Junior Division: Kristin Smith of West Rowan Middle School for "How Oil Spills Spread Under Differing Water Temperatures."

Region 6 Elementary Award: Matt Williams of Lincolnton Middle School for "Oil Spills—What Controls Them Best."

Region 7 Senior Division: Chris Hobson of West Iredell High School for "Today's Waste, Tomorrow's Fuel."

Region 7 Junior Division: Alison Stewart of East Burke Middle School for "How Clean is the Air We Breath."

Region 7 Elementary Award: Jared Stone of Cool Springs Elementary School for "What Section of Town Has the Most Pollution in the Form of Airborne Particles."

Region 8 Senior Division: Alan Owen of Rosman High School for "Botanical Oil Pollution."

Region 8 Junior Division: Marc Thomas of Waynesville Junior High for "Oil Spills—Which Absorbent Licks The Slick."

For more information on the Natural Resources Conservation Science Fair Awards, contact the N.C. Wildlife Resources Commission, Division of Conservation Education, 512 N. Salisbury Street, Raleigh, N.C. 27604-1188, or call (919) 733-7123.

Calendar

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Listings for this calendar should be conservation-oriented and should be sent at least four months in advance.

June 1-30

American Rivers Month will be celebrated around the nation and state. Check local papers for fishing events, canoe trips, river festivals and education seminars. For more information about activities to celebrate and heighten awareness of our nation's rivers, contact the conservation group American Rivers, 801 Pennsylvania Avenue S.E., Suite 400, Washington D.C. 20003, or call (202) 547-6900.

Officers Confiscate Weapons and More

Poachers' Guns, Equipment Used for Hunter Education Classes

Wildlife Commission enforcement officers are using deer decoys to teach nighttime poachers a hard lesson in the consequences of illegal hunting. In turn, they're using the weapons and other equipment seized from the poachers to teach ethics at hunter safety classes.

In just a three-county area, officers in Randolph, Chatham and Lee counties charged 44 individuals with night deer hunting in a four-month period last fall.

Along with the arrests, the officers confiscated thousands of dollars worth of weapons, equipment and vehicles. Over 50 rifles, shotguns, handguns and muzzle loaders were taken from poachers, among those several collectible quality firearms. Officers also seized bows and arrows, tree stands, five trucks, two cars, a motorboat with trailer, a canoe, a johnboat and a 4-wheeler.

In the District Courts across central North Carolina, judges have been awarding many of the seized weapons to the Wildlife Commission's hunter education project. In addition to loss of weapons, most poachers have received fines and loss of hunting privileges.

Many of the arrests resulted from the use of deer decoys. One notable decoy case resulted after Officer Ashley Thompson gave a public presentation in Chatham County and used a deer decoy as a display item. A gentleman approached Officer Thompson after the program boasting that he could easily tell a decoy from a live deer and would not be caught shooting one. The man inspected the decoy closely then left.

A few nights later, Officer Thompson and Officer Bryan Scruggs were working an assignment with the decoy out in a remote location. A vehicle stopped and an occupant shined a light then shot at the decoy. The suspect was apprehended and turned out to be the same man who had inspected the decoy and bragged that he would never be caught shooting at one.

Cattle rustling charges, among others, were filed against another illegal nighttime poacher in Randolph County. In this case, the subjects would ride around looking for deer to shoot at night. If no deer were found, they would begin shooting at cows on a nearby farm. When apprehended and tried, the Randolph County District Court meted out an active prison sentence and heavy fines for both cattle rustling and game law violations.

North Carolina laws allow wildlife officers to seize all items related to illegal hunting activities and to revoke the hunting privileges of defendants who are convicted of game violations.

—Michael D. Faw
Master Officer, District 5

MICHAEL FAW

***These* N.C. Wildlife Commission** *enforcement officers seized these weapons from illegal hunters in a three-county area over a four-month period last winter. The items seized included 55 firearms, two bows with arrows, five trucks, two cars, a boat and trailer, a canoe, a johnboat and other assorted hunting equipment. Some of the equipment is used in the Commission's hunter education project.*

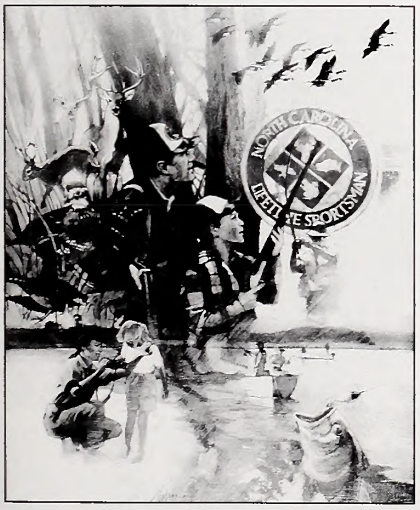
Check Newspaper for Events

National Fishing Week Held in June

N.C. WILDLIFE RESOURCES COMMISSION

***National Fishing Week** will be celebrated across the nation June 7-13. This year's theme will be "Cast Across America," focusing on the many types of fish species and fishing opportunities available to America's anglers. Check local papers or publications for events and activities in your area.*

Wildlife Endowment Fund Report



March 1993

Principal Balance
$18,042,229.30
Interest Earned
$11,278,827.49
Total Receipts
$29,321,056.79
Interest Used
$4,123,817.48
Fund Balance
$25,197,239.31

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

How Not To Bait Doves

by Vic Venters

June is a prime month to plant millet for dove fields. Doves are attracted to all varieties of millet. Seeding and maturation dates depend on the region and weather conditions, but generally browntop millet matures in about 65 days. It offers excellent food, but the seed spoils relatively quickly. Dove Proso millet usually matures in 70 to 80 days and the seeds last longer. Millet can either be broadcast or drilled. Fertilizer and lime requirements will vary from site to site, so you may need to pull and test soil samples.

In addition to benefitting doves, millet fields also provide breeding habitat and cover for quail, rabbits and other ground nesting wildlife through the summer, and food for many nongame species—such as songbirds—in the fall and winter months.

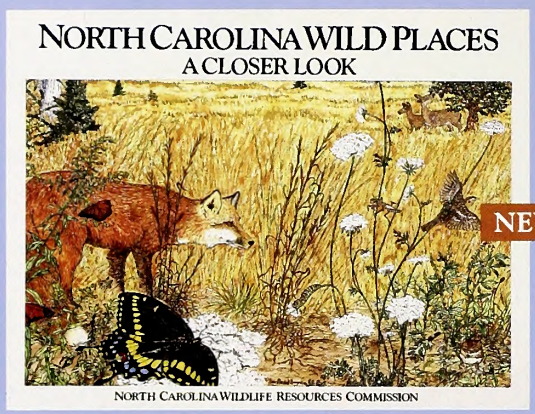
Hunting over grain fields planted specifically for wildlife or by bonafide agricultural practices is completely legal, but every year numerous North Carolina hunters are cited for hunting over baited fields, which are not legal.

The Migratory Bird Treaty Act—which is the federal law regulating the hunting of migratory birds such as doves—is a strict liability statute wherein a hunter's guilt can be established without having to prove that he or she knew of or intended to violate the law. It is, therefore, a dove hunter's responsibility to ensure that he or she does not shoot in or over a baited field. In the cases where hunters get into trouble with baited fields, it's often when they hunt over improperly-planted or baited wheat fields that have been top sown in late summer or early fall. For this reason, spring-planted millet or grain fields that have been grown for wildlife and/or with bonafide agricultural practices offer hunters legal ease of mind as well as offering numerous benefits to wildlife.

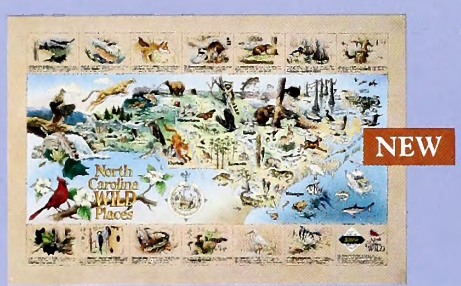
To obtain all legal planting guidelines, and to help clear up potential misunderstandings regarding crop manipulation, you should contact your local county cooperative extension service agent. Planting and harvesting guidelines vary from region to region in North Carolina, so be sure to obtain appropriate local guidelines before planting a field to hunt doves over.

The N.C. *Wild* Store

Take advantage of these great items and you'll support conservation education throughout North Carolina. Proceeds from the sale of these publications will support the development and production of educational projects and programs.

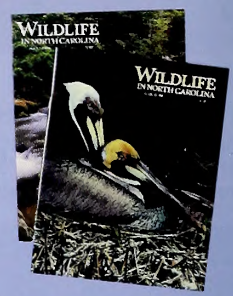


E1. NORTH CAROLINA *WILD* PLACES: A CLOSER LOOK: *Easy-to-read text and Anne Marshall Runyon's delightful illustrations make wildlife habitats come alive in this 82-page book. Discusses 13 habitats across the state.*



E2-4. NORTH CAROLINA *WILD* PLACES MAP PRINT: *Charming, signed limited-edition art print showing North Carolina's WILD places as seen by artist Jackie Pittman. 1,000 regular and 100 artist's proof prints. Also available as a poster. 36" x 24". Shipped flat.*

E5. NORTH CAROLINA *WILD* PLACES POSTERS (SET OF 3): *Posters of "Old Field" and "Mountain Cove Forest" from* North Carolina WILD Places: A Closer Look. *Shipped folded with poster version of* WILD Places Map.



WILDLIFE IN NORTH CAROLINA MAGAZINE: *Great photos, great writing and a great bargain 12 times a year.*

M2. WILDLIFE IN NORTH CAROLINA MAGAZINE BINDER: *Store 12 issues in this sturdy binder.*

M3. WILDLIFE IN NORTH CAROLINA BOOK: *The best of* Wildlife in North Carolina *magazine.*

N1-N5. WILDLIFE HABITAT ART PRINTS: *Five colorful limited-edition prints depict wildlife within distinct habitats. 18" x 24".*

P1-P2. N.C. WILD ART PRINT "FEELIN' LAZY": *All proceeds from the sale of these prints will benefit Project WILD and other wildlife programs. 24" x 18".*

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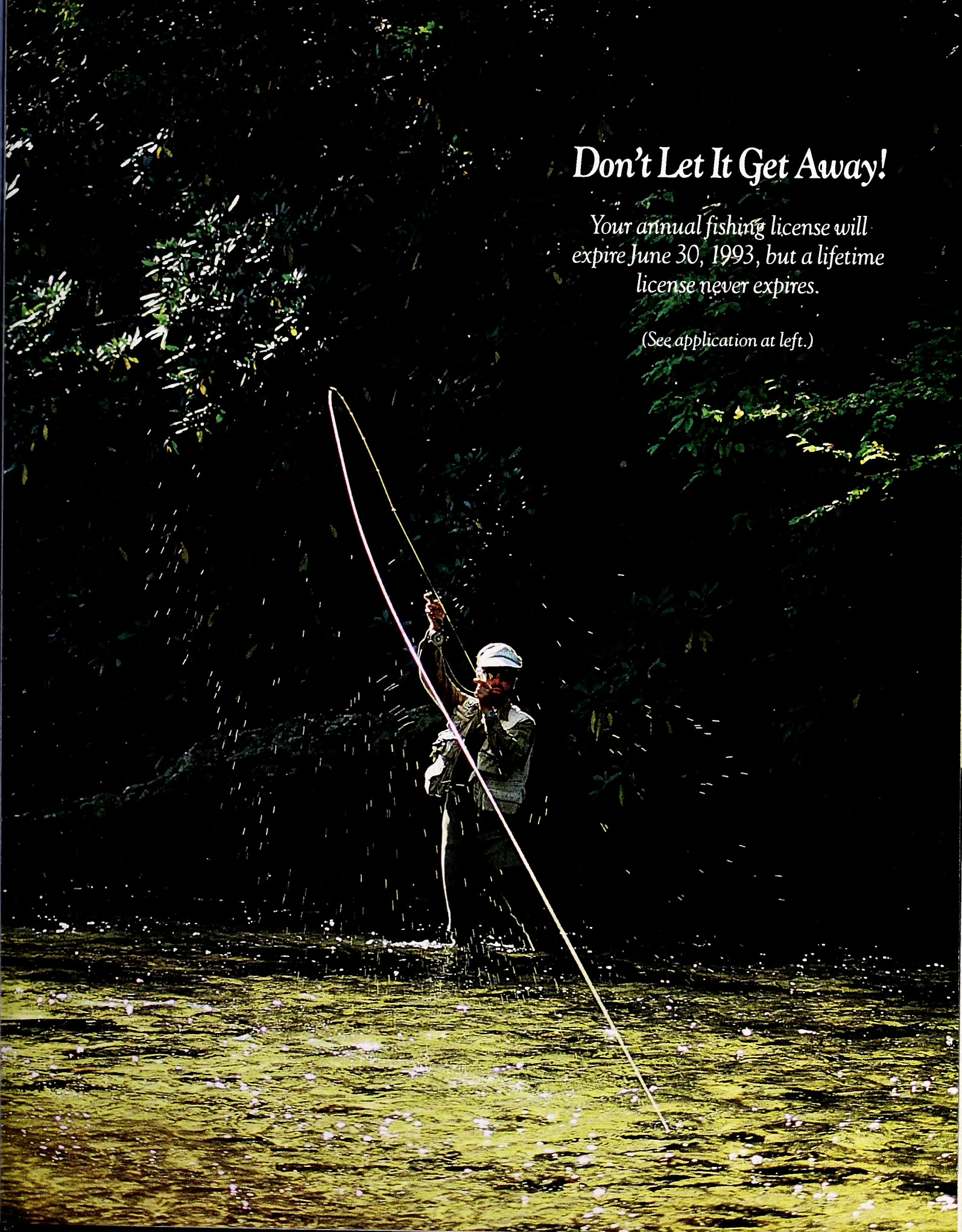
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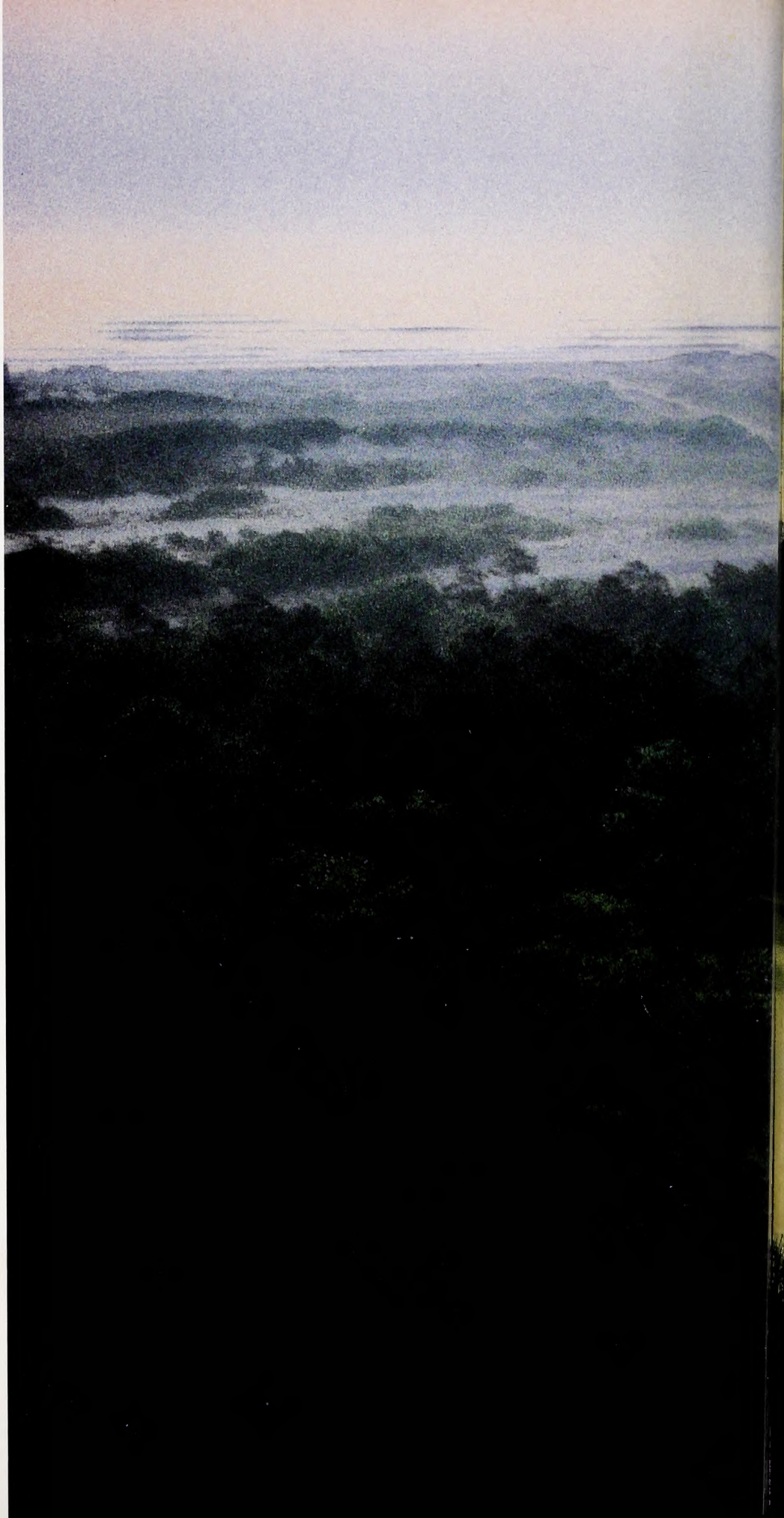

A Decade Ago

Standing watch on a misty early morning in 1982, Corolla Lighthouse towers over the sandy lanes and undeveloped dunes of the northern Outer Banks. To see this view as it exists today, turn to page 5.

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Currituck Then and Now

by Jim Dean

You cannot visit Currituck these days without wondering about its future or recalling fond memories of this grand place. Here are a few of mine.

—The late Joe Brooks, book author and fishing editor for *Outdoor Life* until his death in 1972, pioneered fly-rodding for bass in Currituck Sound and Back Bay in the late 1940s and '50s with bamboo fly rods. One of his favorite brackish-water bass flies was the Marsh Hare, a weedless, slow-sinking streamer created by Tom Loving of Baltimore. Brooks is credited with catching an 11-pound bass at Currituck, a true lunker for brackish waters and the biggest ever caught there on a fly.

JIM DEAN

—In the late 1960s, we fished out of Waterlily one May when conditions were ideal for fly-rods. We cast popping bugs against the undercut edges of the marshes, and two of us caught and released 180 large-mouth bass in two days. Many were better than 2 pounds, and several topped 5 pounds. At its best, Currituck may well have been the premier bass-bugging spot in the world.

—In the mid-'70s, the caretaker of the Currituck Shooting Club had a black Labrador with a unique hobby. In summer, when blue crabs were molting, it would hunt the grassy shallows for softshells and gently carry them alive to an open holding pen, then drop them in. Club members ate well while that dog was living.

—When Eurasion watermilfoil invaded the Sound, it created vast weedbeds that would clog the most powerful outboards. There were wild schemes to get rid of it, including spraying aerial herbicides, but bass fishing was terrific and the favorite weedless lure was a Johnson Silver Minnow and porkrind. The milfoil disappeared naturally, probably a victim of the same fluctuating levels of salinity that chased out the bass.

—When guide Bud Lupton arrived at Poplar Branch shortly after daylight to meet a party of fishermen, he was driving a battered tank truck with a sign that read "Septic Tanks Pumped." "It's my new business when I'm not guiding," he said. "You know, boys, I've been sucking this stuff all my life, but this is the first time I ever got paid for it."

—On a flight to shoot aerial photos of the northern coast in the early 1970s, the only signs of civilization from the Virginia line to the village of Duck were Corolla Lighthouse, the shooting clubs and a few scattered fishing camps.

—Until recently, all the guides used juniper skiffs, some equipped with ingenious, rounded canvas tops of local design that were mounted on sliding metal hoops so they could be raised easily in rough weather. The long push poles were made of ash, slightly flattened on the business end so they would slide easily through the water. No modern bass boat can match a poled juniper skiff as a fishing platform.

—Even some of the hunters were changing by the 1980s. "I've had high rollers from northern cities come down here, get up at dawn, and spend all day sitting in a cold duck blind reading books," one guide told me, shaking his head incredulously. "Didn't even bring shotguns."

—A few days after Christmas in 1981, I drove with my father, two brothers and son, Scott, to Currituck. That evening, the late dean of Currituck guides, Blanton Saunders, told tales around the oil heater. "Listen carefully," I whispered to Scott. "You may never have this opportunity again." At dawn the following morning, we crossed the half-frozen sound in 15-degree temperature and 30-knot winds while ducks rose in distant flocks like smoke.

Clearly, Currituck will never be the same, but can the bass and waterfowl return? There are lots of scenarios. For what it's worth, here's mine. Salinity has been a historical problem in Currituck, and bass have come and gone many times. If salinity levels drop and stabilize, good bass fishing could return. I think that is likely to happen, and I expect good fishing to last until salt returns again or water quality deteriorates further from nutrient enrichment or development-related pollution.

The case for waterfowl is more complicated because most species are in long-term decline everywhere. Yet, why are ducks that still winter in North Carolina avoiding Currituck? Perhaps the dabbling ducks that have always been most common on Currituck are going elsewhere simply because salt has killed so much of the freshwater grasses they eat. Also, it may be that diving ducks haven't filled the gap because salinity hasn't been high long enough to establish the foods they prefer. If, indeed, fluctuating salinity over the past decade has created a temporary limbo, more ducks may return to Currituck once stability is reestablished—at least for awhile.

The wild card, of course, is the effect of massive development on water quality. If manmade pollution isn't controlled, then we have truly seen the last of the old Currituck, and salt levels will never matter again. Then we can write the obituary for what may have been the world's best bass and duck pond. At least Joe Brooks and Blanton Saunders won't have to read it.

A Bird's Eye View

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WILDLIFE IN NORTH CAROLINA

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Cover *William Bartram encountered a similar magnificent view of North Carolina's mountains from Wayah Bald when he traveled this way during the American Revolution. Photographed by William S. Lea.*

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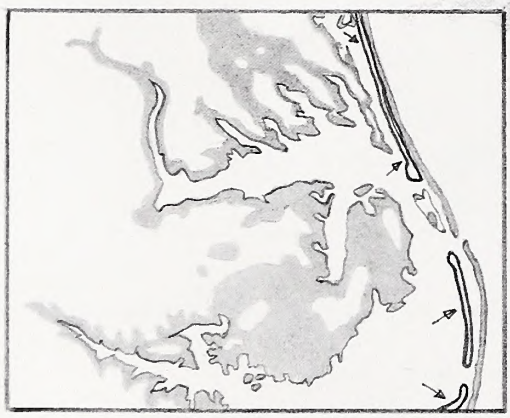


Map source: *Land of the South*, Clay, Escott, Orr, Stuart (Oxmoor House, 1989).

***An eerie ghost forest** emerges from a Currituck beach, evidence of the dynamic nature of barrier islands (above). These red cedar trees were part of the island's maritime forest that was swallowed by migrating dunes hundreds of years before. Barrier islands move constantly because the seas are rising, a process that could make the coastline of the state look like this in 500 years (left). Dark areas may be flooded. Arrows show future locations of barrier islands.*

Ghost Forests

written by Lawrence S. Earley
illustrated by David Williams

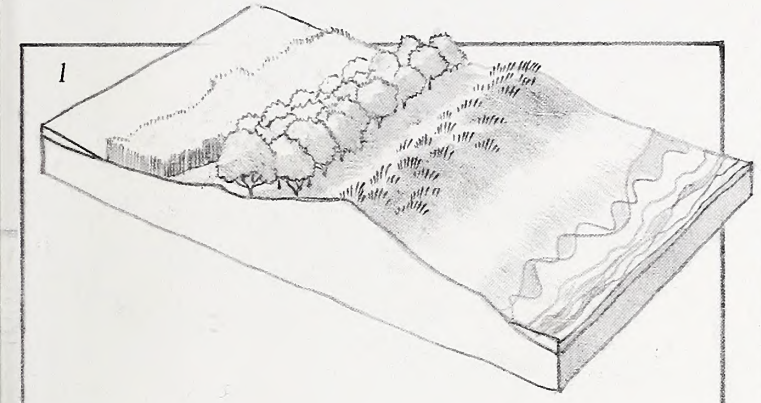
Along the beach above Corolla on the Currituck Outer Banks you'll find an amazing sight. Hundreds of cedar tree stumps 2 or 3 feet high sit in the surf in clusters of two or three, sometimes more. Obviously cedar trees don't grow in salt water, so how do we explain their presence on the beach?

"Ghost forests" like this one are also found on several other beaches along our coast and the coast of other southeastern states bordered by barrier islands. These dead trees are dramatic evidence of a little-heeded geological truth —barrier islands are moving all the time.

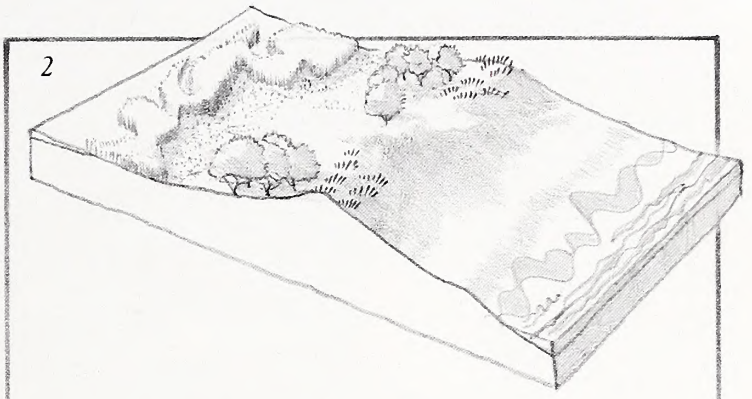
Several hundred years ago, a maritime forest grew where the beach is now while the beach lay a half mile to the east. But the barrier island is a dynamic system and it migrated westward toward the mainland like enormous tank treads. Eventually, the restless sands covered the forest and moved on, leaving the stumps to be uncovered hundreds of years later by the surf.

Our barrier islands migrate constantly because of a simple fact: the seas are rising. In their informative book *The Beaches Are Moving*, Wallace Kaufman and Orrin H. Pilkey Jr. point out that world seas have been rising for the past 15,000 years, even since the climate began to warm and the glaciers began to melt. Yet, if the seas are rising, why don't they eventually cover barrier islands? Why do the islands move instead?

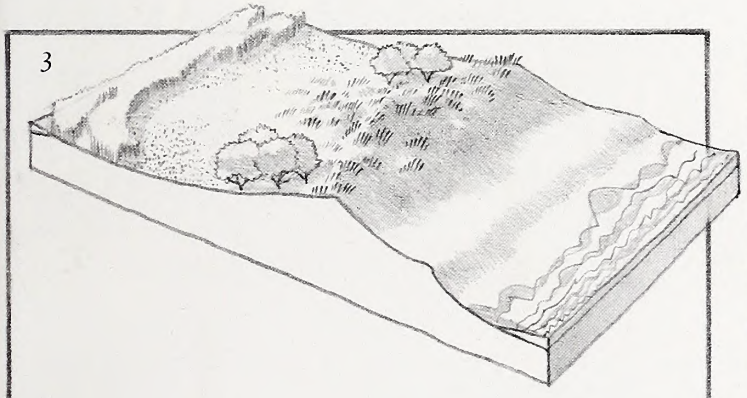
The answer is that rising seas constantly force sand from the



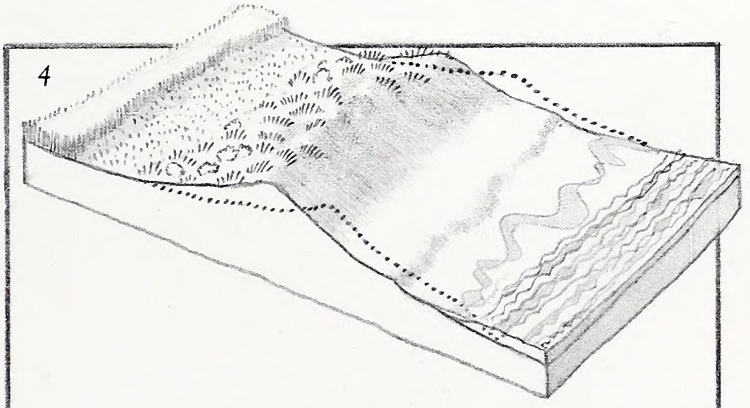
A barrier island *consists of a beach, a dune system, maritime forest with flat areas behind the dunes, and marsh fringing the sound. A barrier island may change its location, but it keeps its component parts.*



Forces behind *island migration include overwash, by which storm surges bulldoze sand through breaks in the dune line. The sand and salt initially create gaps in the island's maritime forest.*



In time, sand is pushed *into the marsh area, killing the eastern edge and extending the western edge into the sound. Plants colonize the sand behind the original dunes, causing new dunes to form.*



The old dune line *is reduced to beach and a new dune line rises behind the old one. Maritime forest grows behind the new dunes and the overwashed sand extends the marsh farther into the sound.*

Illustration source: *The Beaches Are Rising*, Kaufman and Pilkey (Duke Univ. Press, 1979).

beach side of a barrier island to its sound side. As the seas gradually claim the beach, the island grows on its westward edge. The rate of sea-level rise doesn't sound significant—about 1 foot per century—yet for every 1 foot rise in sea level, barrier islands move 100 to 1,000 feet inland.

Sand is moved in several ways—by the wind, by the tides through the inlets that separate the different parts of the island chain, and especially by storms that break through the line of sand dunes, a phenomenon known as "overwash." Overwash occurs when a strong storm surge from a hurricane or northeaster breaches a weak or low spot in the protective dunes along the beach. A flood of water invades the flat areas behind the dune line, depositing a fan-shaped load of sand called an "overwash deposit." These deposits can reach as far back as the marsh that fringes the westward edge of the island.

As overwash continues over the years and sand accumulates, plants take hold. Prevailing winds shape the sand into a new line of dunes. The existing forest is gradually swallowed by the moving dunes and the marshes on the other side of the island are encroached. The added sand buries the marsh, but the marsh may begin to extend westward into the sound.

Where the old dunes were, waves now pound the beach and new dunes have buried the old maritime forest. In time, the island will move completely over the forest, and on the beach someday in the future, a winter storm will uncover the rot-resistant cedar trees killed centuries before.

Despite such a dynamic system, remarkably little changes ecologically. Salt marsh continually develops on the westward fringes of the ever-moving barrier island while beach is formed on its eastern edges. Maritime forest is found in between.

Barrier islands have become attractive sites for second homes and vacation cottages, and no owner wants to see his cottage fall into the sea. Yet barrier islands may survive by retreating, and the forces of nature are ultimately not to be denied.

KEN TAYLOR

END OF AN ERA Part 2: A New Currituck?

Its role as a sporting paradise is seriously threatened, but Currituck has become a different kind of paradise for many people. Can the new Currituck still preserve the colorful traditions of the old, or will they be lost in the continued clamor of development.

by Lawrence S. Earley

"This has been the worst year for ducks that I can remember," says Carl Ross.

We're talking on a cool, achingly bright February day in Ross' living room in Poplar Branch, on the mainland side of Currituck County. Despite the sunny weather, however, Ross's mood is glum. "I don't see the future in duck hunting here," he says. "I always gave the ducks about 15 years but after this year I'd say it'll be more like five."

The walls of Ross' living room are covered with the venerable iconography of duck hunters—prints depicting ducks over golden marsh grass set against the leaden skies of winter, skeins of geese in the distance. A black-and-white photograph from 1925 shows a cloud of ducks exploding above Currituck like flecks of black pepper. *The ducks was so thick they blotted out the sun.* I remember late Currituck guide Blanton Saunders once saying this about his early years in Currituck.

"It's no exaggeration," says Ross as I point to the photo. "And it wasn't just the ducks and it wasn't that long ago." In 1980, Ross guided for two anglers from Baltimore who caught and released 144 bass in two days. Today, he says, they'd be lucky to catch three bass and they'd need 10 hours to do it.

Waterfowl surveys last winter confirm Ross' pessimism about Currituck's one-time wildlife paradise. Only 12,000 ducks and geese were located in the entire sound, and anglers have long complained that the bass have virtually disappeared. In the meantime, the Currituck Banks has been transformed from a near-pristine barrier island to a community of well-heeled vacationers in expanding subdivisions.

The old Currituck is gone, Ross complains; he's not sure he likes what's replacing it.

One of the most poignant signs of the changing of the guard is the imminent development of the oldest hunt club on the Currituck Banks and one of the oldest on the East Coast. The Currituck Shooting Club, of which Ross is superintendent, plans on turning 600 acres of its upland property into a development with 504 residential lots and an 18-hole golf course, the first links on the northern banks. The clustered residential units will leave about 300 acres in open space, including the golf course. Neighboring Pine Island subdivision will share a waste-treatment plant with the development, with a unique, environmentally sensitive recycling twist: wastewater will be used to irrigate the golf course. The timetable calls for the golf course to be built first, sometime in 1994.

The members, who will be partners in the project, insist that the project will be tasteful with plenty of environmental safeguards. And the club will still operate. "We'll still have a Currituck Shooting Club, we'll still have all the marshes, and we'll still have the marsh buffer zone," says Redge Hanes, club president. A 14-acre private enclave will include the historic clubhouse itself.

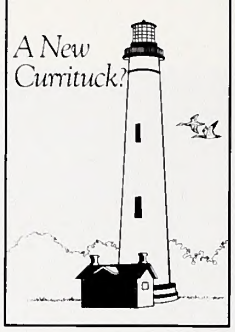
Development had been the furthest thing from members' minds, Hanes says. But then in the late 1980s Currituck County reassessed its property values and the club's taxes ballooned from about $1,500 a year to about $125,000 a year. The club was in serious financial trouble.

"We asked the county to evaluate our land as farmland," says Hanes. "They wouldn't do it." The choices were simple—develop the land or leave it vulnerable to piecemeal condemnation by the county to provide public

KEN TAYLOR

Recently renovated, *the 19th-century lighthouse keeper's quarters sits across from the Currituck Beach Lighthouse. The quarters, lighthouse and Whalehead Club will form the centerpiece of the county's plans to bring tourists to the Currituck Banks.*

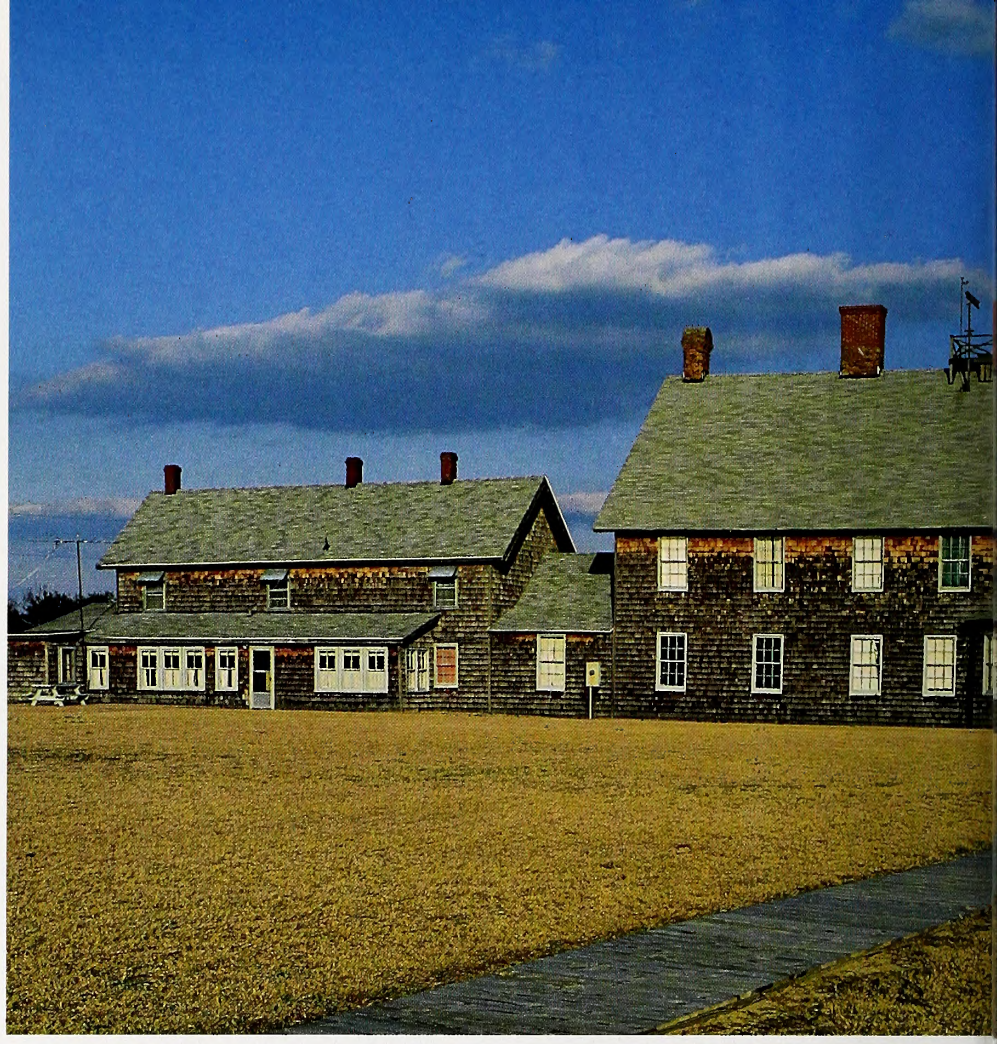
Handsome survivor *of the hunt club era, the Whalehead Club shows off its Art Nouveau styling in Corolla. Currituck County has recently purchased the historic club for use as a museum and a tourist attraction.*



KEN TAYLOR

"We're trying to get . . . citizens to feel that they have more control of their destiny so that we can have growth and development but also preserve what makes this place unique."

—Bill Richardson, Currituck County Manager



services for the growing Banks population. The club chose to develop.

But what about a third alternative? Surely this was a situation tailor-made for a conservation organization such as The Nature Conservancy, which has proved adept with a clever array of financial tools and tax incentives that keep natural lands intact. In fact, the Conservation Fund, out of Arlington, Va., did step in. The group, which has a record of successfully negotiating conservation agreements with large landholders, offered the club a variety of options to protect its holdings. The club could sell it to the the group, donate it and get tax benefits, or use a conservation easement.

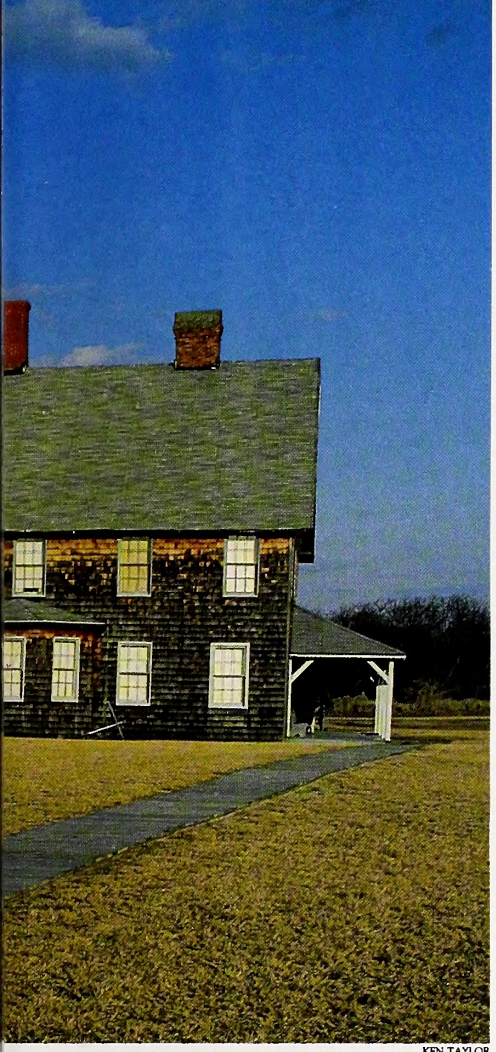
The members felt that the land was too valuable and the tax benefits too negligible to give it away, says Hanes, and a conservation easement might not be accepted by the county. In the end, the money the Conservation Fund offered to buy the property wasn't enough.

For Carl Ross, it's been sad to see the club forced to develop. He feels with some dismay that the dismantling of the club means the end of an era, the era of his father, the superintendent of the Narrows Island Club, and his grandfather, who was the superintendent of the Pine Island Club for 45 years.

"I always thought it would be the greatest thing in the world to be the superintendent of a club," he says. "It was something I always dreamed about because it's been in the family for so long."

Like the efforts to preserve the integrity of the Currituck Shooting Club, other chances to preserve the pristine character of the Banks have proven equally futile over the years. In 1980, a U.S. Fish and Wildlife Service proposal to acquire 15,880 acres of the Currituck Banks for a wildlife refuge was rejected by a new White House administration unsympathetic to federal land acquisitions. The proposal would have placed all lands north of Corolla and selected lands south of the village into the refuge, requiring buy outs of many landowners. The price tag was steep—a little less than $100 million.

In often heated public hearings in Virginia Beach, Va., and the town of Currituck, supporters of the proposal warned that habitat destruction, pollution and spawling commercialization would follow massive population growth in the area. They pointed to the roads, bridges and other infrastructure costing millions that would be needed to service Outer Banks residents. Further development, they said, would threaten the existence of several endangered species that used the Banks—notably bald eagles, peregrine



KEN TAYLOR

The end of an era *on Currituck's Banks is symbolized by the recent decision to develop all but a small portion of the historic Currituck Shooting Club. About 600 acres of the property will be turned into a golf course and residential subdivision.*

falcons and loggerhead turtles.

Opponents cited the huge price tag as reason enough for rejecting the proposal. They conjured the plight of families forced to give up their homes on the banks. Didn't the federal government already own more than enough barrier islands in Virginia and North Carolina to protect the ecosystem? And couldn't development be controlled through county planning and zoning laws rather than through acquisition?

Surprisingly, the Currituck Board of Commissioners supported the refuge. The state of North Carolina followed its lead, claiming the refuge was "in the best long-term public interest" of the state. The N.C. Wildlife Resources Commission also voted in favor of the proposed alternative, but the Virginia Wildlife Federation opposed it, accusing the FWS of having "a seemingly insatiable appetite . . . to own more land."

After the proposal was abandoned, two parcels of land owned by The Nature Conservancy were subsequently sold to the FWS in 1984 and 1985 to form a slimmed-down Currituck National Wildlife Refuge of almost 6,000 acres. Another parcel was purchased by the state to make the Currituck Banks National Estuarine Research Reserve. The Conservancy itself kept a sliver of land running from the sound to the beach.

The defeat of the larger wildlife refuge in 1980 was not the first time that public ownership of the Currituck Banks had been derailed. In the 1960s, during Terry Sanford's administration as governor of North Carolina, the North Carolina Seashore Commission examined the possibility of making the Currituck Banks into a national park.

"One of the things we discussed was either including part of Currituck Banks in the Cape Hatteras National Seashore, or creating another park in that area," recalls Woodrow Price, chairman of the commission. "I know we did have some public hearings in Currituck about what to do down there, but we never came to any concrete conclusions." Currituck County itself was opposed to the idea, and the matter was dropped.

Former Gov. Terry Sanford also remembers the proposal. "I thought we ought to simply take that wonderful land and protect it for the public," he says. "The county said, we need this tax base. I understood that point of view. I suppose we could have thrown our weight around, but I don't think we could have won that battle."

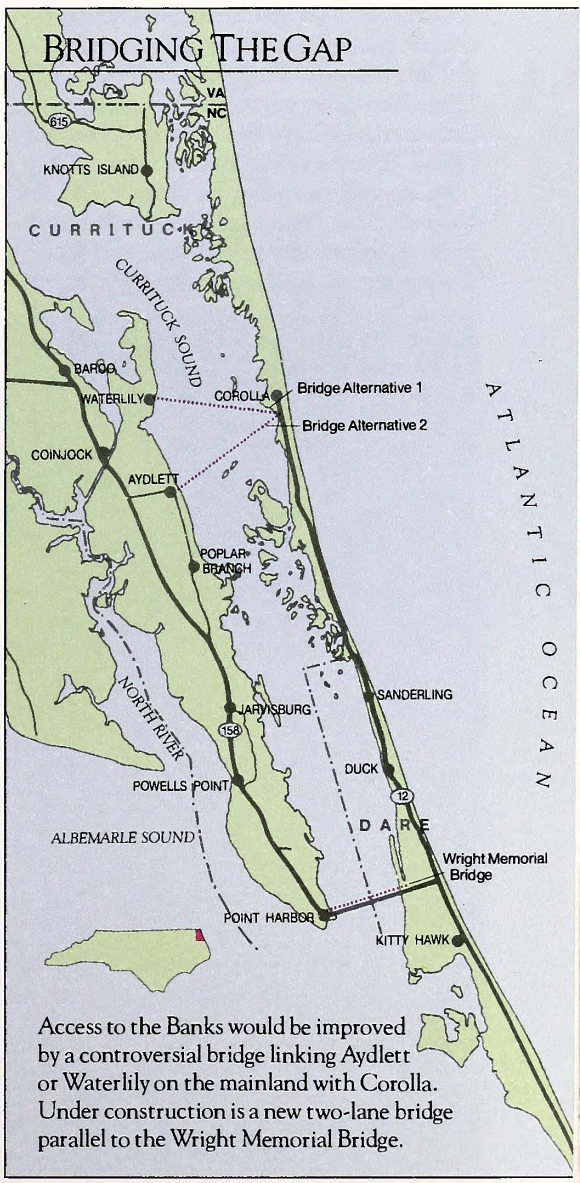
As Currituck's once teeming fish and wildlife populations continue to decline, its colorful hunting and fishing traditions are fast becoming memories, memories the county wants to keep alive. In 1992, Currituck County purchased the handsome, copper-roofed and somewhat dilapidated Whalehead Club at Corolla which it intends to restore as a museum and tourist center. The Whalehead Club was in actuality never a club but the 20,000-square foot residence of a couple, Edward C. Knight and his wife Amanda Marie LaBell. When his wife was denied membership in some of the other Currituck clubs, Knight decided to build his own, and did so beginning in 1922. The 28.5-acre property cost the county $2.4 million, which it will fund through a 3 percent occupancy tax collected from beach cottage rentals on the Outer Banks and mainland campgrounds.

County manager Bill Richardson says the Whalehead museum will be the centerpiece of a tourist center that will include other historic structures near Corolla, such as the lighthouse and the newly restored lighthouse keepers quarters. Displays of float blinds, decoys and other artifacts will recall Currituck's age of waterfowling that seems to be coming to an end.

"I think it will help us protect our culture and our heritage and our history," says Richardson, "because we're rapidly growing and if we don't do this I'm afraid we're going to get lost in the new construction."

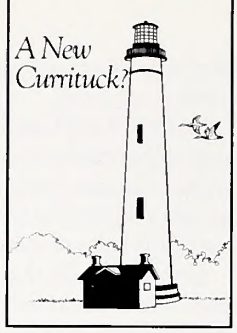
Richardson says that the museum will also help businesses on the mainland and Banks sides by drawing Virginia tourists into Currituck, tourists who are currently bypassing the region for Nags Head and Cape Hatteras.

"I can almost see tours developing from the museum to Monkey Island," he says enthusiastically. The county owns Monkey Island as a result of an exchange with the Fish and Wildlife Service. "We're starting to get some golf courses developed in the county. The men can go play golf and their wives can go on a tour. They can go by boat to the Whalehead Club, go to the museum, walk down to the ocean for a swim, picnic on the property or go to some of the restaurants in the area. On their way back they can visit Monkey Island



SOURCE DEPARTMENT OF TRANSPORTATION (1989)

Access to the Banks would be improved by a controversial bridge linking Aydlett or Waterlily on the mainland with Corolla. Under construction is a new two-lane bridge parallel to the Wright Memorial Bridge.



and end up in some shops on the mainland. There's a lot of potential to look at."

Despite Richardson's rosy vision, plans to draw more tourists to the Currituck Banks always run into an issue that has plagued Currituck for decades—access. The old Currituck—the one of sporting legend—endured for a century and more despite, and even because of, the Banks' inaccessibility. Referring to its remoteness, one writer called the marshes of the Currituck Shooting Club the "ultima Thule" of duck hunting. But now that the county has turned to tourism, its remoteness is seen by some as its Achilles heel.

The problem of access was partly solved in 1984 when the state took over a private road that stretched from the Dare County line to Corolla, but the N.C. Board of Transportation opposed extending the road, NC 12, to Virginia. Thus despite promises by the developers of the northern subdivisions in the 1970s, the road ends at Corolla today, leaving residents of subdivisions between Corolla and the Virginia line no alternative but to drive the beach at low tide to get to their homes. Access into Virginia along the beach was cut off in 1973 when Back Bay National Wildlife Refuge was closed to all vehicular traffic except for a limited number Currituck residents with passes.

For tourists coming south out of Virginia, Currituck's Banks are still "ultima Thule." To get from Norfolk to the Whalehouse Club and other attractions, they must drive an indirect route south along NC 168 and US 158, cross the Wright Memorial Bridge into Dare County, and then drive north on NC 12 to Corolla—a two-hour drive or more.

Which is one reason the county is pinning its hopes on a bridge that would link the northern mainland, either at Aydlett or Waterlily, with Corolla on the Outer Banks. The proposed bridge would tie the economies of mainland and Outer Banks Currituck, officials say, and it would give police and medical emergency units better access in emergencies—ambulances in Currituck are about 90 minutes away from Corolla. In the event of a hurricane, the bridge would also be an important evacuation route for an Outer Banks population expected to grow to a seasonal peak of 27,000 by the year 2000.

"It takes us 9 1/2 hours right now to evacuate the Banks," says Richardson. "A bridge would shorten that time."

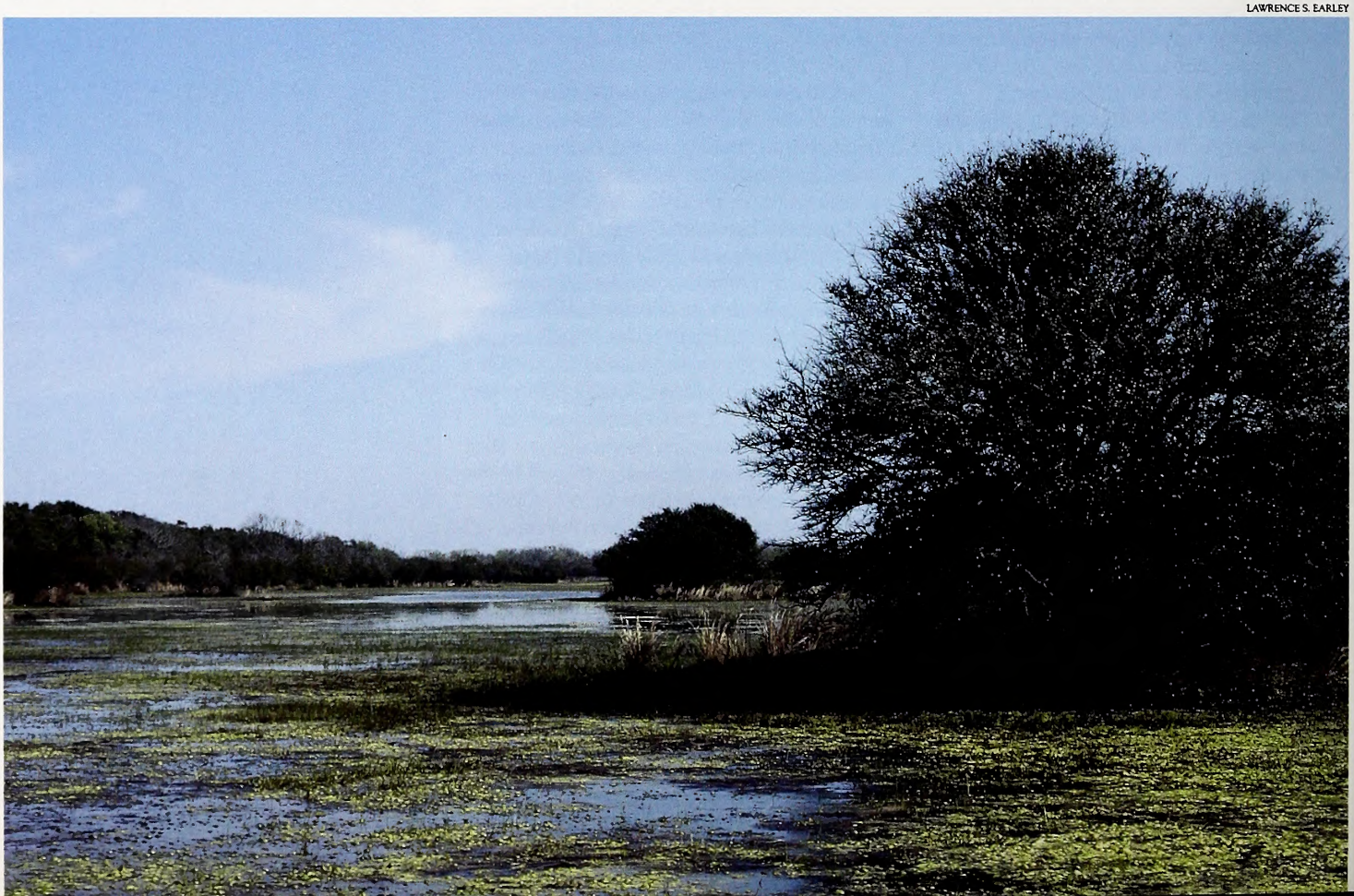
The Corolla bridge proposal has some powerful backers, including Sen. Marc Basnight of Dare County who has recommended making it the first toll bridge in the state. The Department of Transportation proposed the bridge in 1989, and it is included in DOT's 1992-1998 Transportation Improvement Program.

Yet like the wildlife refuge proposal of 1980, the Corolla bridge has stirred passionate debate on both sides of the sound. Opponents argue that the bridge would harm important black duck habitat and would pump even more traffic onto two-lane NC 12, turning it into a "French Fry Alley" of fast-food restaurants.

"They keep harping on the issue of safety," says Colon Grandy about bridge supporters. Grandy owns a mainland market that will be affected by the loss of traffic siphoned off to the Banks. "We're not living in the days when people didn't know a hurricane was coming until it got there. People have satellite dishes in the back yard and a 24-hour weather channel that gives at least five days notice of impending hurricanes."

The wetland flats *on the Currituck National Wildlife Refuge draw thousands of snow geese each winter to feed. A proposal that would have placed almost all of the Currituck Banks in a wildlife refuge was dropped in 1980.*

LAWRENCE S. EARLEY



LAWRENCE S. EARLEY

Even on the Banks, many opponents feel that there can be such a thing as too much access. Certainly that's the feeling at Whalehead subdivision in Corolla where the bridge will practically be in residents' back yards. In a recent straw poll among members of the Whalehead Homeowners' Association, opponents of the bridge outnumbered supporters by a wide margin.

Terry Ruggles, past president of the association, says the developers stand to gain the most from the bridge. "Most people go to Currituck to escape what the developers want to bring in," he says. "This is one of the last remote places on the East Coast that you can get to in a day's drive. If the bridge goes through, Norfolk will be an hour to an hour and fifteen minutes from the Banks. That makes it a commuter community.

"That's not why I went there."

Some of these arguments were cited in the feasibility study of the Corolla bridge prepared for DOT in 1989. The study found that the most cost-effective and least environmentally harmful solution to the problem of access to the Banks would be a parallel bridge next to the Wright Memorial Bridge that connects Point Harbor with Kitty Hawk. Currently under construction, this bridge is due to be completed in September 1995.

The problem with the Corolla bridge alternative, the study said, was that it would in effect make the Banks too accessible. Among the adverse secondary effects stemming from the bridge would be renewed political pressure to extend NC 12 north through the Banks' nature sanctuaries and to lift the ban on traffic through Back Bay National Wildlife Refuge and False Cape State Park in Virginia. New development brought about by the bridge could also affect the supply and the quality of the Banks' water. At present, a shallow aquifer provides its sole water supply. A study by the state's Division of Water Resources has already warned that this aquifer is inadequate to the future needs of the banks unless conservation measures are imposed or other sources of water are found. The county has formed a task force to study the water problems on the Banks.

No decision on the Corolla bridge will be made until an environmental impact statement is prepared, says Frank Vick, assistant manager with DOT's Planning and Environmental Branch. "We'd want to know whether the additional development on the banks since the 1989 feasibility report has created additional pressure for better and safer access to the banks. We also recognize that Currituck Sound is a fragile ecosystem and we've got to deal with how we affect it." The environmental impact study is expected to take two years.

According to the Greek philosopher Heraclitus, everything changes and nothing is permanent. It's a helpful perspective from which to look at Currituck past and present. Yet the problem in Currituck is not whether change can be stopped or rolled back, but whether it can be directed and controlled.

County manager Bill Richardson believes that it can be. "We're trying to get . . . citizens to feel that they have more control of their destiny so that we can have growth and development but also preserve what makes this place unique," he says. Yet ironically, what made Currituck unique for so long is precisely what is disappearing the fastest—its remoteness and pristinity, its hunt clubs, the high quality of its water, the diversity of its habitats, the numbers of its bass and waterfowl, the colorful cultural traditions of its people. And there is some reason to think that what they are being replaced with—luxury subdivisions, boat marinas, golf clubs and the like—is hardly unique, but merely upscale versions of leisure communities up and down the coast.

Can the county control its own destiny as it hopes, or does it have a development tiger by the tail? It's a question that sportsmen and other Currituck lovers from all over the country will be asking in the coming years. ☐

LAWRENCE S. EARLEY

On Mackey Island National Wildlife Refuge, *managers sow mustard plants to feed waterfowl in winter (above). Evidence of the restless nature of barrier islands, these ancient cedar tree stumps lining the beach at Currituck (below) show that a maritime forest once grew where the beach is today.*

In Search of Speckles

JIM YUSKAVITCH

The old-timers have always said that native "speckles" are different from brook trout. Genetic studies indicate they may be right.

by Vic Venters

If you talk to almost any Appalachian old-timers about brook trout, they'll tell you two things. First, North Carolina's native brook trout are properly called "speckled trout" or "speckles" and, second, these fish aren't brook trout—or at least not the same brook trout that have been stocked in mountain streams for the past century.

"Speckles," they say, are different from their hatchery-bred brethren—they are smaller, more brightly colored, with longer fins and snouts. And they're better to eat, too. By local opinion, "speckles" are the original wild salmonid inhabitants of the Southern Appalachians, while stocked brookies and their stream-bred descendants are Northern interlopers of an inferior sort.

While it's too early to say conclusively that the old-timers have been right all along, recent genetic research on regional brook trout populations is revealing that there may be more to this fish story than simply folk tales and mountain myths.

After almost two decades of research, genetic scientists at the University of Tennessee are now reasonably confident that the "speckled trout" of mountain lore is indeed a Southern Appalachian strain distinguishable from other brook trout strains. What they still don't know is if this native strain warrants classification as a separate species or subspecies of brook trout, or how prevalent or common the native strain remains in the streams of the Southern Appalachians.

In the next few years, though, biologists hope to answer these questions. As part of a larger project also encompassing streams in the Great Smoky Mountains National Park, in Virginia and in east Tennessee, biologists with the N.C. Wildlife Resources Commission began stream sampling this summer to analyze the genetic makeup of some of the state's known wild brook trout populations.

When completed, this regional study, and another in the Smokies examining hybridization between hatchery-strain and native-strain populations, will help shape regional federal and state management efforts for the brookie and for the fragile cold-water environment on which the fish depends. The results will be of interest not only to trout fishermen, but to anyone interested in the biological diversity of the Southern Appalachians.

Brook trout are the only salmonid native to the Southern Appalachians. Sometimes called an Ice Age relict, Southern brook trout populations are found only in cold-water streams of the mountains today, a whittled-down range compared to eons ago when the region was much cooler. Actually a member of the char family, brook trout remained common in most Southern Appalachian streams until the late 19th century down to about 1,500 feet in elevation.

Wild brook trout populations began to crash in the Southern Appalachians around the turn of the last century. With the arrival of railroads came rapacious logging practices. Large-scale and unregulated clearcutting was the norm, and the subsequent scalping of most streamside vegetation allowed water to warm and silt to bleed into streams. The brookie, intolerant of all but the cleanest and coldest water, disappeared from many watersheds.

The brookie, too, is a naive fish and easy to catch. Subsistence fishing and overharvest surely contributed to its decline on many streams. Pollution and development added to woes in other streams. By the mid-1930s, brookies had retreated mainly to small streams with elevations of 3,000 feet and above in most of its Southern Appalachian range.

***National Park Service biologist** Steve Moore (left) searches the waters for brook trout, known locally as "speckles," in an isolated headwater stream in the Great Smoky Mountains National Park. Recent research by biologists and genetic scientists indicates that the "speckle" (above) is probably a distinct native Southern Appalachian strain of brook trout.*

GERALD ALMY

This brightly colored, *stream-bred brook trout was taken in a stream in Virginia. Research indicates that the New River may mark the northernmost range of the Southern Appalachian brook trout strain.*

The early response to brook trout declines across the Southeast was massive stocking—with non-native species like rainbow trout from the West Coast and brown trout from Europe. Brook trout were also restocked, but fisheries managers of the time found that "speckles" from Southern streams fared poorly in hatcheries. Consequently, brook trout and eggs from Northern locales were used. Given the fledgling state of fisheries science of the time, little thought was given to the genetic implications of stocking northern strain fish into existing brookie populations.

In the Great Smoky Mountains National Park alone, over 800,000 hatchery brook trout were stocked from the mid-1930s to the mid-1970s, almost all of which came from northern strains. Despite restocking, brook trout populations continued to decline in the park and elsewhere, even in waters where suitable habitat was available. Populations were stable only in the most remote, isolated headwater streams. By contrast, brown and rainbow trout were more tolerant of silt and warmer waters. These non-natives thrived in their new mountain environs and quickly established expanding, self-sustaining populations.

In the mid-1970s, biologists began to realize that the decline of the brook trout and the successful establishment of rainbow and brown trout were related. After studies to examine the relationship between the three species, it became apparent that non-native trout were essentially driving brookies from the streams.

The problem was size, or in the brookie's case, a lack thereof. The brook trout is an inherently smaller fish than either rainbows or browns, and is apparently unable to compete for holding cover and other prime stream habitat against these larger, and thus more aggressive, trout. Over the years, the non-native trout, especially rainbows, gradually eliminated brookies from many freestone streams.

Given its mandate to protect native species, the National Park Service closed the remaining brook trout streams in the Great Smoky Mountains National Park in 1975. At that time, out of the roughly 1,000 miles of suitable water, pure brook trout populations remained in only about 123 miles of Park waters, with only about 40 miles of that considered immune to encroachment from rainbow trout.

In 1976, Park fisheries managers began electrofishing and removing rainbow trout from some brookie streams in an effort to restore native trout populations. Over the last decade and a half, these restoration efforts have continued and have been successful in Park streams where there are natural barriers—such as vertical waterfalls over 6 feet in height—that prevent upstream migration of rainbows. So far, Park fisheries managers have restored about 4.5 miles and the work continues today.

During the late 1970s, researchers also began to look into the genetic heritage of the Park's brook trout. At the time, scientists still didn't know whether the "speckle" strain of brook trout had ever really been a distinct strain, or even if it still existed after decades of stocking and probable hybridization with Northern-strain brook trout.

Curiously, biologists had noticed that brook trout were able to coexist and prosper in streams containing mixed rainbow/brook trout populations north of the Mount Rogers area of southwestern Virginia. Below the New River, however, rainbows and browns gained ground at the brookie's expense. This observation led scientists to speculate that the "speckle," if it existed as a distinct Southern brook trout strain, was probably smaller than its Northern brook trout cousins and thereby less suited to compete with non-natives.

Two of these early tests, using genetic research called starch gel electrophoresis, found what appeared to be a distinct Southern Appalachian fish. More recent research has confirmed this and found that the region has at least three general brook trout strains: a "speckle" strain native fish, a Northern-strain hatchery fish, and a hybrid fish with Northern and "speckled" genes.

"Our recent work shows that substantial genetic differences exist between the apparently unstocked Southeastern populations and introduced fish of hatchery origin," said Gary McCracken, a zoology professor at the University of Tennessee, who has been project leader for the genetic research on brook trout in the Southeast. "Furthermore, the fish that have been tested from apparently unstocked streams all share similar important genetic characteristics. From all available evidence, we believe we've got a unique fish here."

In other words, McCracken and others believe a "speckle" strain almost certainly exists. But, they caution, more information is needed before taxonomists can know whether or not to classify the Southern-strain brook trout as a separate subspecies or species. After all, brook trout are found over a huge geographic range in a wide variety of locales across North America. It is natural for brook trout from a Maine beaver pond or a Pennsylvania limestone stream to have some genetic differences with brookies from the Southern Appalachians. Genetic differences in and of themselves do not necessarily make for another species.

While the genetic issues are very complex, the central question for taxonomists basically boils down to whether or not "speckle"-strain brook trout populations share enough major genetic similarities among themselves, and are genetically distinct enough from the Northern-strain fish, to warrant listing as a separate species or subspecies.

"We're working under the assumption that

GERALD ALMY

***Former fisheries biologist** Bill Bonner uses a bow-and-arrow cast to fish inaccessible pockets of water. In the past century, brook trout have declined or disappeared from larger mountain streams like this, largely because of competition from non-native rainbow and brown trout, as well as from habitat destruction.*

if we were to go north surveying streams there would be two possible outcomes," explained McCracken. "One would be that we simply find a continuous distribution and wide variety of genetically different fish as we move from region to region, or from stream to stream. In this scenario there would be no clear geographic demarcation of genetically different fish."

"The other possibility," McCracken continued, "is that we will encounter clearly defined strains, species or subspecies that are segregated in or by major geographic boundaries. I think there is a very high probability that the latter will be the case."

McCracken uses the analogy of the cutthroat trout, a widely distributed Western trout with 15 recognized subspecies, each genetically adapted to the environments where each is found. "The situation with brook trout, also found over a very wide range, may be similar," he said.

Biologists have their eyes set on the billion-year old New River as a natural geographic break. "The region of the New River drainage in southwestern Virginia forms the boundary for several other floral and faunal groups," writes McCracken, "and we suspect that this region is the most likely boundary for the Northern versus Southern brook trout strains."

A major region-wide project now underway should, when completed, answer these final genetic questions. This project, which includes streams in North Carolina, has expanded genetic sampling in and beyond the boundaries of the Great Smoky Mountains National Park. In Tennessee, researchers found 22 apparently pure "speckle" populations last summer out of the 39 brook trout populations surveyed so far.

Rick Bevins, trout biologist for the Tennessee Wildlife Resources Agency, estimates east Tennessee to have about 90 brook trout populations outside of the Park, and the agency is planning to sample all to its populations to determine their genetics.

As part of the project, Wildlife Resources Commission biologists in North Carolina began surveying streams for genetic strains this summer. Results from genetic testing have not been completed, but the Wildlife Commission has found about 158 streams comprising 200 miles of pure brook trout

YUKIO YAMADA

This male brook trout *was taken from a small stream in southern Ontario. Note its larger size and its different coloration from a Southern Appalachian "speckle." Found over a wide geographic range in eastern and western North America, brook trout often exhibit varying physical and genetic characteristics from region to region.*

water so far. There's also an additional 74 streams with 117 miles of mixed brook trout and other wild trout water. Commission biologists have also identified another 46 streams comprising 45 miles of water that contain no trout, but offer suitable habitat for brookies.

"This list is just a starter," said Jim Borawa, the Wildlife Commission's mountain trout project leader. "There are a lot of streams, particularly in District 9 (the region west of Asheville) that we haven't surveyed yet. We expect to find additional brook trout populations up there, too. The genetic sampling we're conducting this summer will give us an idea of what sort of brook trout strains we've got in some of our streams."

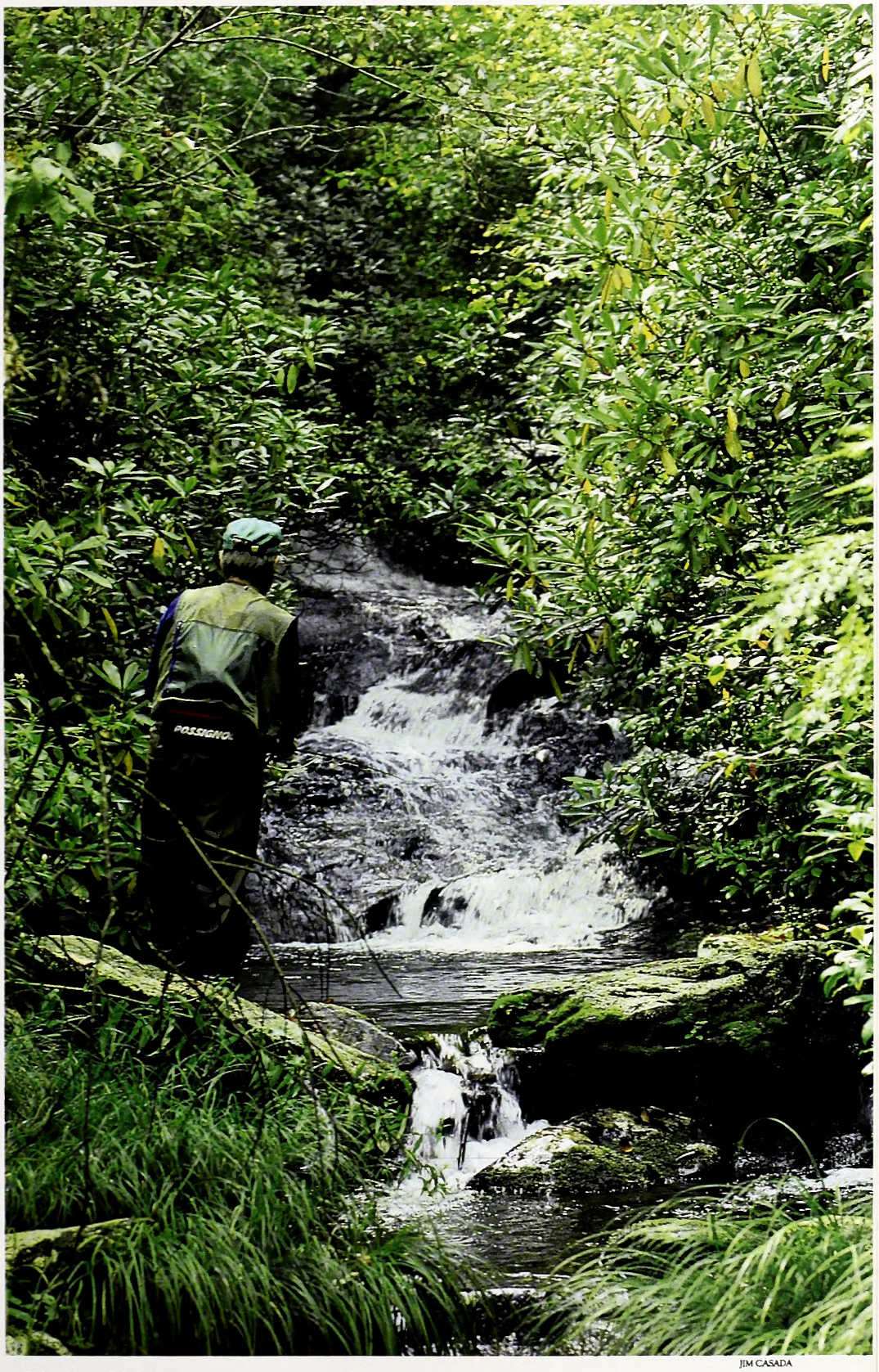
McCracken and Steve Moore, fisheries manager for the Great Smoky Mountains National Park, are very encouraged by the results of the population sampling so far. "These findings in the Park and in Tennessee have been tremendously good news," said Moore. "For awhile we suspected native-strain brookies might exist only in a few Park streams. In the Park, we discovered 15 more apparently native-strain populations last summer, and the results from Tennessee show that these fish are widely scattered throughout the mountains. The fish appears much more common than we once thought."

The other major research project to be conducted within the Great Smoky Mountains National Park will examine the effects of hybridization between hatchery-strain brook trout and "speckle" populations. "Our data from the Park so far suggests that when stocking is stopped, fish populations with native genes may recover over time in a stream, while hatchery gene fish decrease in population," McCracken said. "It's possible that the native gene brook trout survive or breed better than hatchery gene fish and, over time, the hatchery gene fish will wash out of the population. Of course, this has yet to be proven but if it's happening it could be tremendously important."

Anglers and others may roll their eyes and wonder why any of this genetic minutiae is important. But the answers to these questions will one day have, and are already having, considerable effect on the direction native brook trout management takes throughout the Southern Appalachians.

Take the Great Smoky Mountains National Park. The eventual goal of Steve Moore is to reopen a recreational brook trout fishery in the Park, which is currently closed to all angling.

*A **solitary angler** fishes a typical Southern Appalachian brook trout stream. Pure "speckle" brook trout populations are most often found in cool and unpolluted headwater streams where barriers, such as waterfalls, prevent upstream migration of rainbows, browns and hatchery-bred brookies.*



JIM CASADA

Moore is planning to remove rainbows and restore another 65 miles of brook trout streams that are protected by natural barriers. When completed, this would make about 220 miles of brook trout streams safe from non-native trout encroachment. At that point, Moore hopes some brook trout angling could be reopened. Similar restoration projects could take place on other National Park Service lands such as the Blue Ridge Parkway.

One issue of early concern to some biologists was the possibility that the Southern Appalachian brookie might be listed on the federal endangered species list, if taxonomists decided the "speckle" was a separate species or subspecies. These worries have largely evaporated of late because the "speckle"-strain brookie has been found in so many locales both inside and out of the Great Smoky Mountain National Park. "The concerns we once had about some sort of potential listing have pretty much been mitigated," said Moore. "We're finding more and more apparently unstocked populations of these fish over a wide geographic range."

Southern-strain "speckles" will certainly play a major role in restoring suitable streams that are currently barren of brook trout. In Tennessee, with the financial assistance and cooperation of Trout Unlimited, the Tennessee Wildlife Resources Agency has constructed a small hatchery specifically for rearing Appalachian-strain brook trout.

The direction that management decisions take will, in North Carolina at least, depend upon the findings of current research projects and, subsequently, decisions by taxonomists on classifying the fish. Possible management moves could include increased protection of brook trout habitat from adverse land use practices and restoration of selected brook trout streams using transplanted native-strain fish.

Any increased emphasis on native brook trout management, however, should not be interpreted to mean that there will be widespread removal of either wild or stocked brown and rainbow trout populations from regional trout streams. "There are only a limited amount of streams that can reasonably be restored for native brook trout," said Steve Moore. And in many places, rainbows and browns occupy niches unsuitable for brook trout, thereby providing excellent sport for many thousands of anglers.

The "speckle's" presence in waters cool and clear is a heartening symbol of innocence preserved in this era of environmental decay. With help from science and sound management, this relict from the Ice Age should still be around when we are the old-timers of tomorrow.

The author acknowledges James A. Yuskavitch's excellent article, "Saved By The Barriers," in the Summer 1991 issue of Trout *magazine, as a resource and would also like to thank biologists Jim Borawa (N.C. Wildlife Resources Commission); Steve Moore (Great Smoky Mountains National Park); and Gary McCracken (University of Tennessee) for their assistance with this article.*

Big Game Tag Report - Number 17

...a summary of North Carolina's big game harvest for 1992-93 as reported by hunters to Wildlife Cooperator Agents

Why should a hunter go out of his way to tag and report the turkey gobbler he just shot? How many deer were harvested during the season here in North Carolina? Was the total deer harvest for this period greater or less than this figure for last season? How is this information used? These are questions that often surface during discussions of North Carolina's big game tagging system. The big game tagging system is a reporting procedure which requires that all wild turkey, boar, bear and deer which are harvested by hunters here in the state be tagged at the site of harvest and that certain information be reported to any one of approximately 1,500 Wildlife Cooperator Agents for later collection by the Wildlife Resources Commission. This procedure became mandatory in the fall of 1976. Successful game management is based on many factors and individual pieces of information, including in this case, big game harvest figures. The more a game manager knows about population trends and numbers, the easier it is for him to make decisions affecting seasons or other regulatory matters. Sound big game management must be the result of the combined efforts of sportsmen and the staff of the Wildlife Commission. While the figures in this report represent the reported harvest and may vary from the actual harvest, they are the best such figures available at this time. Please do your share to see that future reports of this nature are as complete as possible by tagging and reporting your big game harvests and by encouraging your fellow sportsmen to do the same.

If you have questions about the procedures or this report, please contact the Division of Wildlife Management, North Carolina Wildlife Resources Commission, 512 N. Salisbury Street, Archdale Building, Raleigh, North Carolina 27604-1188.

1992-93 Reported Black Bear Harvest

County	Male	Female	Total	Game Land	Other Land	Rifle	Shot Gun	Muzzle-Loader	Hand Gun	Bow
Avery	2	3	5	3	1	4				1
Beaufort	22	26	48		45	44	2		1	
Bertie	12	2	14		14	9	5			
Bladen	17	6	23	4	17	11	12			
Brunswick	6	5	11		10	7	4			
Buncombe	14	4	18	7	8	15	3			
Burke	7	4	11	9	2	10				1
Caldwell	11	6	17	9	8	15			1	1
Camden	8	3	11		7	4	5		1	
Carteret	9	6	15	6	7	14				
Cherokee	59	30	89	70	12	65	18		2	
Chowan	3	5	8		8	1	7			
Clay	21	10	31	27	3	24	1		6	
Columbus	5	3	8		8	6	1		1	
Craven	5	8	13	3	10	12				
Cumberland	3	3	6		6	4	2			
Dare	1	3	4		4	2	2			
Duplin	1		1		1	1				
Gates	11	9	20		15	6	13		1	
Graham	73	51	124	104	9	110	7		5	1
Haywood	34	21	55	20	34	53			1	
Henderson	6	5	11	3	7	10				
Hyde	59	23	82		76	74	5		1	
Jackson	11	2	13	9	4	9	4			
Jones	20	18	38	10	26	36	2			
Macon	42	10	52	44	4	51				1
Madison	23	18	41	20	21	37	2	1	1	
McDowell	28	23	51	24	25	39	6		2	4
Mitchell	5	3	8	1	7	8				
Onslow	11	4	15		12	10	3		1	
Pamlico	11	10	21		17	20			1	
Pasquotank	6	3	9		5	2	7			
Pender	21	11	32		26	24	4		4	
Rutherford	1		1		1	1				
Sampson	4	3	7		6	3	2		2	
Swain	7	20	27	15	8	21	4			2
Transylvania	6	8	14	7	6	13			1	
Tyrrell	21	20	41		39	39	1			1
Washington	12	14	26		24	26				
Wilkes	1		1		1					1
Yancey	20	17	37	7	28	27	3		2	5
Totals	639	420	1,059	402	572	867	125	1	34	18

1992-93 Reported White-Tailed Deer Harvest

County	Sex Harvested				Antlered Bucks Per Sq. Mile	Weapon					Location	
	Antlered Bucks	Button Bucks	Does	Total		Shotgun	Rifle	Muzzle-Loader	Bow	Hand-gun	Game Lands	Other Lands
Alamance	745	86	305	1,136	3.76	89	590	312	128	3		1,136
Alexander	379	53	142	574	2.41	22	339	88	118		3	571
Alleghany	958	145	424	1,527	7.85	16	930	253	310	3		1,527
Anson	1,494	271	1,092	2,857	3.85	345	1,621	570	252	7	48	2,809
Ashe	974	177	456	1,607	3.70	26	920	334	302	7	25	1,582
Avery	83	8	53	144	0.45	5	71	27	38		95	49
Beaufort	1,722	188	911	2,821	3.39	179	2,442	95	22	3	21	2,800
Bertie	1,925	300	1,588	3,813	3.90	2,033	1,514	123	50		94	3,719
Bladen	2,189	348	1,498	4,035	3.34	2,174	1,615	112	63	11	93	3,942
Brunswick	1,467	183	845	2,495	2.31	1,820	467	79	34	9	29	2,466
Buncombe	164	30	173	367	0.38	18	274	36	33		38	329
Burke	791	113	426	1,330	1.99	44	861	207	194	1	276	1,054
Cabarrus	117	8	43	168	0.69	83	5	42	30	8		168
Caldwell	499	37	184	720	1.37	29	488	88	108		154	566
Camden	238	21	59	318	1.71	117	190	9				318
Carteret	468	21	159	648	1.72	226	313	61	20	3	68	580
Caswell	1,511	316	974	2,801	5.86	800	1,167	573	229	9	244	2,557
Catawba	293	20	105	418	1.63	12	215	69	113		3	415
Chatham	1,947	232	994	3,173	4.13	199	1,604	804	532	13	427	2,746
Cherokee	26	2	1	29	0.07	3	23	2	1		24	5
Chowan	431	50	208	689	5.13	251	374	22	27	2	2	687
Clay	56	1	7	64	0.33	3	52	2	5	1	53	11
Cleveland	303	24	87	414	1.40	16	319	34	38	2	20	394
Columbus	1,955	175	953	3,083	2.96	1,749	1,078	88	56	1		3,083
Craven	1,645	161	824	2,630	3.27	433	1,961	115	59	2	102	2,528
Cumberland	792	97	416	1,305	2.17	233	914	70	72	1		1,305
Currituck	400	30	155	585	3.96	134	400	27	20		3	582
Dare	129	16	37	182	0.51	58	47	53	20	1	105	77
Davidson	665	62	332	1,059	2.34	30	631	228	161		43	1,016
Davie	608	48	280	936	5.15	35	487	214	182	4	7	929
Duplin	1,275	87	419	1,781	2.80	564	1,114	38	28	2	5	1,776
Durham	332	29	125	486	2.35	128	175	111	61		156	330
Edgecombe	1,479	212	1,022	2,713	6.35	760	1,683	95	79	16		2,713
Forsyth	117	9	17	143	0.66	13	78	28	21	2		143
Franklin	1,225	103	521	1,849	4.11	951	726	90	51	6		1,849
Gaston	57	1	8	66	0.32	5	32	16	12			66
Gates	1,092	270	966	2,328	4.51	1,833	372	46	32	11	18	2,310
Graham	22		5	27	0.08	1	15	3	7		20	7
Granville	1,378	143	690	2,211	3.91	443	1,001	497	236	4	140	2,071
Greene	248	8	26	282	2.03	87	167	16	4	3		282
Guilford	371	49	190	610	1.44	105	276	117	96	1		610
Halifax	2,206	405	1,676	4,287	5.00	1,261	2,675	155	61	12		4,287
Harnett	315	22	79	416	0.90	166	117	69	45			416
Haywood	135	14	44	193	0.32		151	16	24	2	173	20
Henderson	123	10	81	214	0.52	5	129	29	42		100	114
Hertford	682	132	464	1,278	2.97	873	351	30	2	2		1,278
Hoke	154	8	15	177	0.60	127	38	3	9		3	174
Hyde	1,196	245	1,203	2,644	3.25	492	1,663	276	141	5	166	2,478
Iredell	904	109	319	1,332	3.56	45	774	246	240	1	2	1,330
Jackson	10		2	12	0.02	1	7	2	2		10	2
Johnston	611	30	182	823	1.63	117	542	47	100	2		823
Jones	1,391	166	803	2,360	3.90	261	1,934	71	27	9	111	2,249
Lee	260	12	102	374	1.54	27	209	84	50	1	23	351
Lenoir	515	55	214	784	2.63	106	622	23	15	3	2	782
Lincoln	148	13	44	205	1.04	10	107	36	49	1		205
Macon	141	4	30	175	0.32	6	122	14	31		118	57
Madison	126	24	58	208	0.38	3	139	20	38	1	114	94
Martin	1,015	102	498	1,615	3.70	927	590	44	10	5	21	1,594
McDowell	440	51	250	741	1.17	18	452	85	173	2	241	500
Mecklenburg	109	16	56	181	0.52	76	1	69	32	1		181
Mitchell	252	33	127	412	1.52		221	56	123	1	64	348
Montgomery	1,785	328	985	3,098	4.45	199	1,518	891	442	6	429	2,669
Moore	516	63	225	804	0.99	396	243	103	50	1	4	800

County	Sex Harvested				Antlered Bucks Per Sq. Mile	Weapon					Location	
	Antlered Bucks	Button Bucks	Does	Total		Shotgun	Rifle	Muzzle-Loader	Bow	Hand-gun	Game Lands	Other Lands
Nash	702	86	300	1,088	2.49	451	568	25	23	7		1,088
New Hanover	60	4	50	114	0.77	42	54	4	3	1	2	112
Northampton	2,615	525	1,953	5,093	7.92	2,131	2,552	190	75	12		5,093
Onslow	1,687	256	1,059	3,002	3.14	1,636	1,066	81	162	6	53	2,949
Orange	788	80	346	1,214	3.41	234	525	257	189	3		1,214
Pamlico	670	65	371	1,106	3.21	84	944	40	16	3	11	1,095
Pasquotank	242	12	48	302	3.10	125	157	9	1			302
Pender	1,774	196	1,155	3,125	2.47	1,170	1,670	89	98	13	76	3,049
Perquimans	620	92	400	1,112	5.21	407	659	12	14	4		1,112
Person	801	122	437	1,360	3.42	461	550	257	70	4	43	1,317
Pitt	977	95	431	1,503	3.01	163	1,233	35	17	5		1,503
Polk	197	12	56	265	1.06	2	189	36	37		42	223
Randolph	738	89	302	1,129	1.49	102	635	214	171	4	41	1,088
Richmond	667	96	373	1,136	1.80	563	403	114	38	2	95	1,041
Robeson	474	47	215	736	1.08	390	292	31	11	1	1	735
Rockingham	998	115	387	1,500	3.07	134	790	298	258	4		1,500
Rowan	669	98	299	1,066	2.85	75	562	235	178	8	41	1,025
Rutherford	742	92	322	1,156	1.77	39	818	133	145	4	38	1,118
Sampson	1,072	114	596	1,782	2.03	640	1,028	41	31	2		1,782
Scotland	473	39	188	700	2.46	457	152	32	47	1	116	584
Stanly	809	100	382	1,291	4.45	128	662	264	210	13	9	1,282
Stokes	345	53	104	502	1.17	37	279	83	93	1	3	499
Surry	465	29	161	655	1.53	24	397	83	133			655
Swain	18		4	22	0.04	2	13		7		16	6
Transylvania	158	7	43	208	0.47	5	155	25	22		131	77
Tyrrell	313	11	69	393	1.31	36	268	72	10		16	377
Union	263	10	36	309	0.95	21	216	42	27			309
Vance	574	40	168	782	3.59	254	420	58	33	3	7	775
Wake	619	29	132	780	1.57	129	480	84	75	3	139	641
Warren	1,283	411	1,412	3,106	4.21	1,815	1,132	79	27	9		3,106
Washington	495	31	187	713	3.41	108	472	75	34	2	35	678
Watauga	243	24	74	341	1.15	6	215	51	56		8	333
Wayne	199	15	89	303	0.88	43	231	13	11	2		303
Wilkes	1,701	170	688	2,559	3.04	30	1,608	384	508	5	89	2,470
Wilson	92		3	95	0.59	30	61	1	3			95
Yadkin	512	57	159	728	3.56	44	408	145	117	1	5	723
Yancey	322	62	221	605	1.27	2	268	103	227		141	464
State Total	70,981	9,260	38,397	118,638	2.36	33,208	62,288	11,858	8,727	315	5,055	113,583

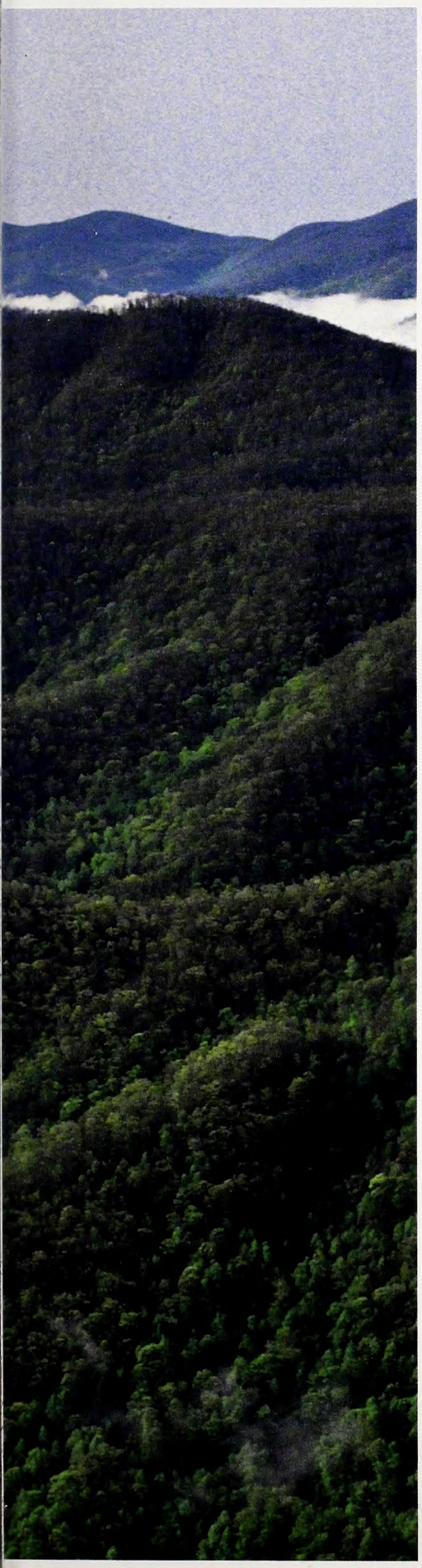
1992-93 Reported Wild Boar Harvest

County	Number Harvested			Location		Weapon Used			
	Male	Female	Total	Game Land	Other Land	Rifle	Shot Gun	Hand Gun	Other
Burke	2	3	5		5	3			1
Cherokee	23	5	28	27	1	20	6		2
Clay	5	5	10	8	2	6		2	2
Cleveland		1	1		1	1			
Graham	28	30	58	54	4	46	9	1	2
Haywood	2	1	3	2	1	1	1		1
Henderson	6	2	8		8	4	2	1	1
Macon	4	2	6	5	1	5		1	
Rutherford	5	2	7		7	6			1
Swain	1	1	2	1	1	1	1		
Wilkes	1		1		1	1			
Totals	77	52	129	97	32	94	19	5	10

1992 Reported Wild Turkey Harvest

County	Age			Total Reported	Location			Weapon Used			
	Adult	Juvenile	Unk.		Game Land	Other Land	Unk. Land	Shotgun	Bow	Muzzle	Unk.
Alamance	38	2		40		40		39			1
Alleghany	115	51	3	169	1	168		164			5
Anson	21	6		27	3	19	5	22			5
Ashe	180	86	5	271	9	247	15	260	1		10
Bertie	71	7	1	79	1	74	4	78			1
Buncombe	18	5		23	9	12	2	22			1
Burke	5	6		11	11			11			
Caldwell	1			1			1	1			
Carteret	2			2	2			1			1
Caswell	324	28	6	358	39	294	25	346			12
Chatham	11	1	1	13	1	10	2	11	1		1
Cherokee	58	10	2	70	56	11	3	69			1
Chowan		2		2		2		2			
Clay	16	4		20	12	6	2	18			2
Columbus	1			1		1		1			
Craven	9			9	4	4	1	8			1
Durham	9			9	2	6	1	8			1
Graham	54	3		57	46	9	2	53			4
Granville	36	5		41	2	31	8	39			2
Halifax	36	5	2	43	1	36	6	43			
Haywood	18	5		23	13	8	2	23			
Henderson	14	1	1	16	6	8	2	14			2
Hoke	1			1		1		1			
Hyde	3	3		6		5	1	6			
Jackson	22	1	1	24	17	4	3	19			5
Johnston	13	7		20		20		20			
Macon	67	11		78	54	21	3	72			6
Madison	16			16	8	3	5	14			2
Martin	33	2	2	37	2	30	5	33			4
McDowell	20	2		22	16	5	1	22			
Mitchell	10	6		16	8	8		15			1
Montgomery	38	7		45	10	30	5	45			
Northampton	39	4	1	44		44		39			5
Onslow	17	5	1	23		23		21			2
Orange	37	4		41		41		39			2
Pender	4	2		6		5	1	6			
Person	112	7	1	120	7	100	13	113	2		5
Polk	34	4		38	5	32	1	38			
Richmond	50	6	2	58	4	47	7	54			4
Robeson	2			2		2		2			
Rockingham	63	6	1	70		70		65			5
Scotland	5	1		6		3	3	4	1		1
Surry	32	14		46		46		43			3
Swain	24		1	25	17	7	1	24			1
Transylvania	38	2		40	15	21	4	40			
Watauga	57	15		72	2	65	5	70			2
Wilkes	48	25	2	75	10	50	15	72			3
Yancey	7	2		9	8	1		9			
Totals	1,829	363	33	2,225	401	1,670	154	2,119	5		101

Previous Five Years Harvests: 1987-680; 1988-1,032; 1989-1,275; 1990-1,534; and 1991-1,818.



WILLIAM S. LEA

INDEPENDENCE NATIONAL HISTORICAL PARK

A Trail for Puc Puggy

At the time of the American Revolution, William Bartram was hunting plants in the land of the Cherokees. Now, his journey is being memorialized by a trail.

by Burt Kornegay © 1993

Deep in the shady recesses of the Nantahala Gorge, in Swain County, western North Carolina, a black-and-silver historical marker, standing next to U.S. 19, bears this inscription:

> *WILLIAM BARTRAM, Philadelphia naturalist, author, exploring this area, met a Cherokee band led by their chief, Atakullakulla, in May 1776, near this spot.*

Behind the marker and a green fringe of trees, the Nantahala River rushes down the gorge, the roar of its rapids punctuated by whoops and screams of whitewater rafters. In front of the marker a line of traffic hurries up the gorge to the "put in" on the river. Few of the passersby notice the state marker. Fewer still pull over to read it. And as the rafters whoop and the cars crowd by, the marker stands in tribute to William Bartram, one of the most remarkable men ever to enter the gorge.

Born in 1739, the son of John Bartram, colonial botanist to the King of England, William grew up a trained naturalist. As he put it, he was possessed by "a restless spirit of curiosity" and a desire to explore "scenes of primitive, unmodified nature." After numerous futile attempts by John Bartram to settle his nature-loving son in one trade or another, William accepted the financial backing of a wealthy Englishman to collect specimens of "rare and useful productions of nature" in the Southern wilds. This started William on what became a four-year botanizing odyssey in the South, often conducted alone, made by foot, horse and canoe. Bartram botanized with such zeal that he discovered dozens of species of plants and animals new to science. And he became known to the Indians as "Puc Puggy"—a Muskogean word meaning "the flower hunter."

In 1791, Bartram published a narrative of the adventure, entitled *Travels Through North and South Carolina, Georgia, East and West Florida*. With its vivid depiction of the southeastern wilderness, the plants and animals and the Indian societies there, Bartram's *Travels* became one of the most widely read narratives of the 19th century. It was translated into European languages and praised by such writers as Coleridge and Carlyle. And the account of Bartram's month-long exploration of "Cherokee Country," including his encounter with Chief Atakullakulla, is one of its most compelling parts.

At the time of Bartram's meeting with the chief, the Cherokee in "the Overhill Towns" of eastern Tennessee had risen up in revolt against unscrupulous white traders. Trying to prevent an all-out war, Atakullakulla was on his way to Charleston to meet with colonial representatives when his and Bartram's paths crossed.

Bartram wrote that the meeting took place

***This portrait** of William Bartram—the Cherokees called him "Puc Puggy" or flower hunter—was painted by Charles Willson Peale in 1808 when Bartram was 69 years old. During his travels, Bartram wrote vivid descriptions of the Cherokees who lived along the Little Tennessee River. No doubt he saw these ridges (left) when he crossed Wayah Bald.*

WILLIAM S. LEA

On his quest to study *and collect botanicals in the relatively unexplored Southeast, William Bartram was impressed by the diversity of plant species and the dazzling beauty of many like this white azalea growing on Wayah Bald.*

in 1776, as the historical marker states, but it actually happened a year earlier, in 1775. Such a discrepancy in dates is not surprising to students of the *Travels*: to judge by the erroneous dating of events in that book, Bartram was a man heedless of correct chronology. What the inveterate naturalist did heed, as he made his solitary way, however, were the plants growing along the Nantahala River, "a very extensive forest, consisting entirely of Hemlock." And, with tensions in the region running high, he also heeded the band of well-mounted Cherokee approaching:

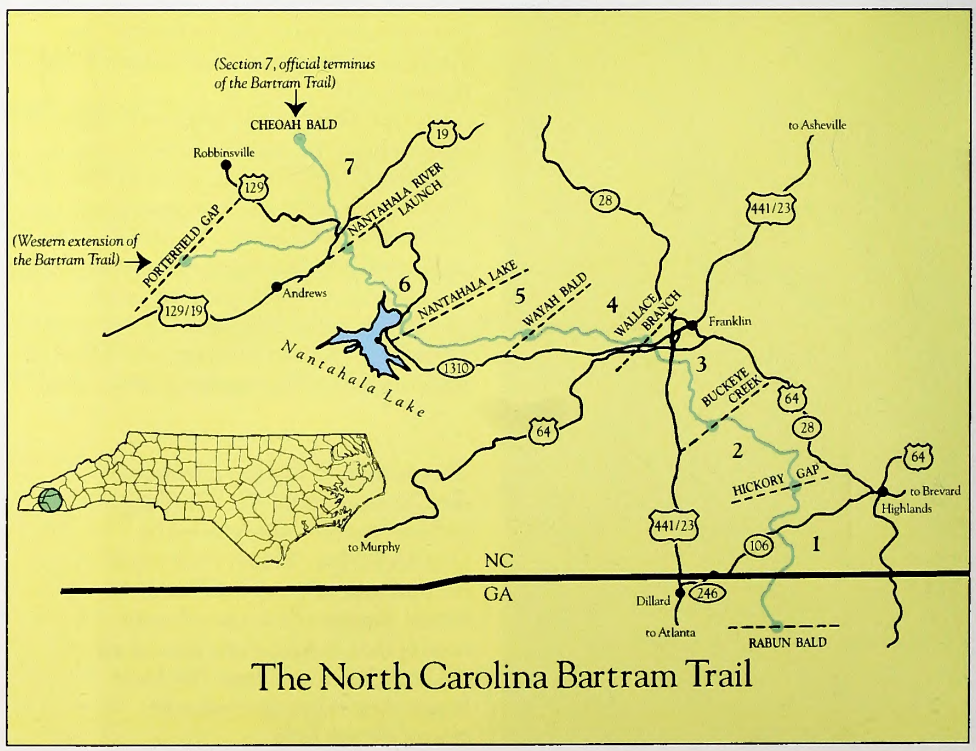
> *As they came up I turned off from the path to make way, in token of respect, which compliment was accepted... for his highness with a gracious and cheerful smile came up to me, and clapping his hand on his breast, offered it to me saying, I am Ata-cul-culla.*

On the north slope of Rattlesnake Knob —a 4,000-foot peak overlooking the southern end of the Nantahala Gorge—there is another kind of marker in honor of William Bartram. It is a solid yellow rectangle, 6 inches tall and 2 inches wide, painted at eye level on the dark trunk of an eastern hemlock. A few hundred feet away, just visible through the trees, is another such marker. And beyond that, at about the same distance, another, then another. These are trail blazes, and they indicate the route of the North Carolina Bartram Trail.

To the north of Rattlesnake Knob, the yellow blazes lead down to the historical marker on U.S. 19. South of the knob, the blazes follow the serpentine route of the Bartram Trail as it descends to Nantahala Lake, then climbs up the western flank of the Nantahala Mountains to mile-high Wayah Bald, where it briefly joins the Appalachian Trail. From Wayah, the Bartram Trail drops steeply on Trimont Ridge, to Franklin, then follows the Little Tennessee River up its valley to a western spur of the Fishhawk Mountains. Cresting the Fishhawks, the trail passes rocky overlooks before it descends to the forested rim of Blue Valley, on the Chattooga watershed, and reaches the North Carolina-Georgia border near Rabun Bald.

At 68 miles and counting, the North Carolina Bartram Trail is the second-longest trail in the western part of the state (the Appalachian Trail being first), and it is second to none in beauty. It is also a unique trail in that it incorporates a canoeable section—an 11-mile stretch of the Little Tennessee, from Otto to Franklin, that links the hiking trail in the Fishhawks with that in the Nantahalas.

The canoe trail closely follows Bartram's original route. Traveling by horse from Georgia, Bartram entered the valley of the Little Tennessee and headed for the Cherokee capital of "Cowee," which was about 5 miles downriver of present-day Franklin. As he rode its length, he described "the fruitful vale of Cowee" as being a mountain-rimmed Eden, settled and cultivated by the Cherokee. He saw "expansive, lucid, green, flowery fields, expanding between retiring hills, and... the rapid Tanase [Little Tennessee] gliding through, as a vast serpent rushing after his prey." Bartram was particularly delighted by



The North Carolina Bartram Trail

DAN PITTILLO

***The yellow blazes** of the Bartram Trail and the white blazes of the Appalachian Trail run together for nearly two miles on Wayah Bald.*

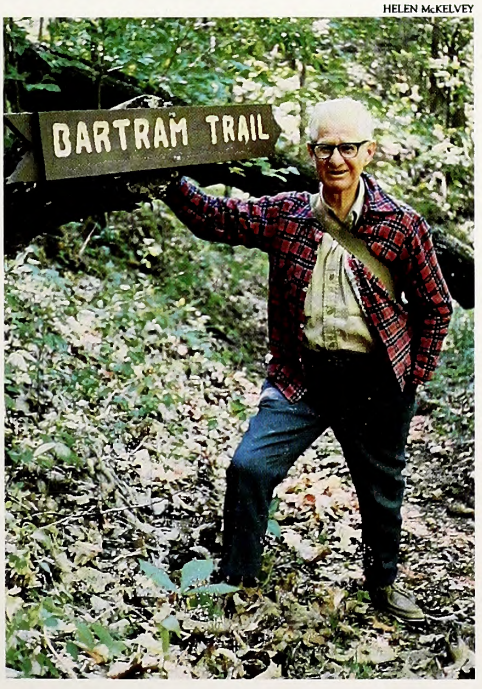
the wild strawberries growing profusely in the meadows, "their rich juice dying my horse's feet and ankles."

In Cowee, Bartram waited for an Indian "guide and protector to the Overhill towns." But when the guide failed to show, Bartram "resolved to pursue the journey alone, though against the advice of the traders." Turning due west, he headed up the Nantahalas.

Approximating Bartram's route, the Bartram Trail also leaves the valley of the Little Tennessee, near Franklin, and in 12 strenuous miles climbs Trimont Ridge to Wayah Bald, which at 5,342 feet, is the trail's highest point. The elevation gain in this section is more than 3,000 feet, but the hiker actually climbs over 5,000, because Trimont Ridge bucks up into many steep knobs, and the trail rides the ridgeline all the way.

Trimont Ridge is worth the effort to hike. Designated a National Recreation Trail in 1985, it is a remote section where the hiker may spot deer, grouse, turkey or bear. But it is

HELEN McKELVEY



***In 1973,** Walter G. McKelvey of Brevard, a retired landscape architect and a student of William Bartram, first dreamed of establishing a North Carolina Bartram Trail. He spent the next four years securing government approval and support, researching the trail route, and encouraging public interest in the endeavor. He directed trail flagging and clearing until within a month of his death, never letting fellow trail workers know that he was seriously ill. On September 10, 1977, he died, two days before the meeting he had scheduled to charter the North Carolina Bartram Trail Society.*

DAN PITTILLO

***Hewing out a trail** is rugged, often slow, work, yet the N.C. Bartram Trail Society has attracted a diverse and willing membership. Here, a work crew levels a stretch of new trail.*

BETH ROGERS

***Officers and board members** of the N.C. Bartram Trail Society plan the route of the Bartram Trail up Cheoah Bald. From left to right, Dan Pittillo, William Haselden, Keith Day, Tim Carstens, Mo Wheeler, Burt Kornegay and Speed Rogers.*

what awaits the hiker at the summit that will most reward his perseverance—as Bartram himself discovered. Having taken a long rest after many "wearisome ascents," he says:

> *I began again to ascend the Jore [Nantahala] mountains, which I at length accomplished, and rested on the most elevated peak; from whence I beheld with rapture and astonishment a sublimely awful scene of power and magnificence, a world of mountains piled upon mountains.*

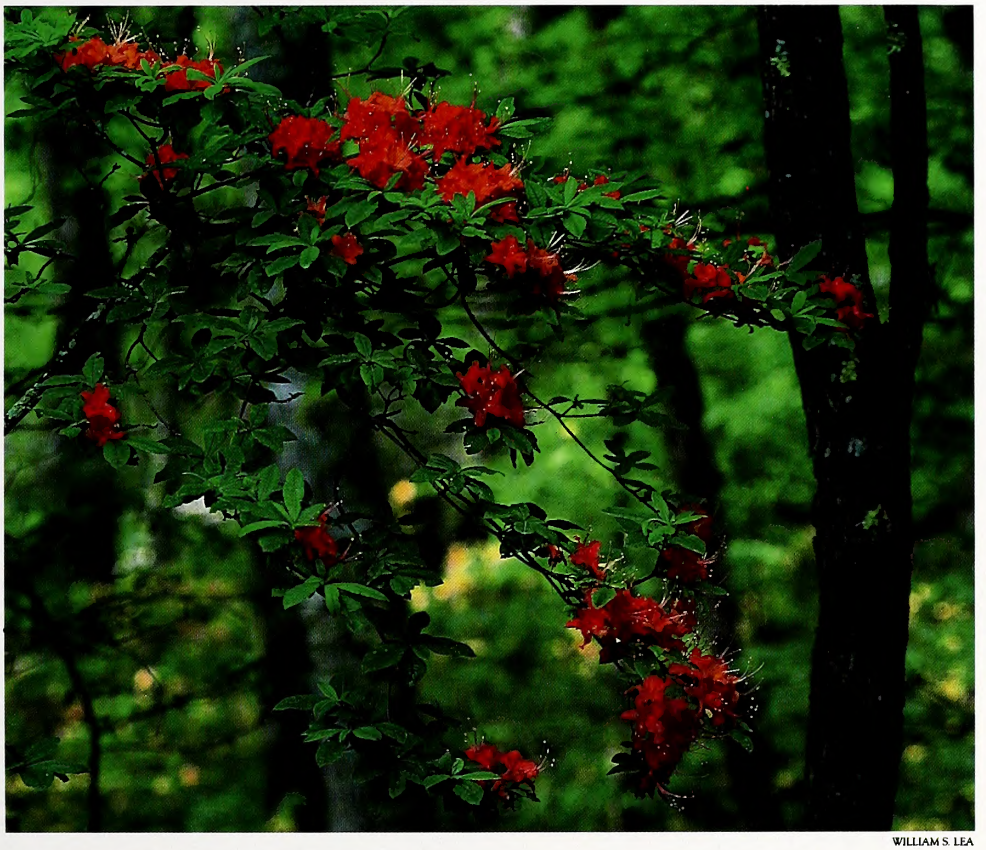
Now 16 years in the making, the North Carolina Bartram Trail is the project of the North Carolina Bartram Trail Society, working in cooperation with the U.S. Forest Service. The goals of the 200-member society are clear: to establish a trail in honor of William Bartram; to locate that trail as close as possible to Bartram's original route through the mountains; and to promote public knowledge of the plants and animals and of the native Cherokee and their culture that Bartram encountered here.

One should not read lightly over the first of the Society's goals, which begins, "to establish a trail . . . . " Since the organization's founding in 1977, its members (just 18 of them initially), along with Forest Service personnel, have spent countless volunteer hours scouting out the route, clearing brush, and, as member Keith Day puts it, "digging dirt and rolling rock" to make a trail across the Southern Appalachians. Some work days have seen as much as 1/2-mile of trail built; other work days, in rugged country, have seen but 100 yards. At times, crews have had to lug their tools 3 to 4 miles just to reach the work site. But then, they had the satisfaction of hiking those miles on a trail they had made.

For every mile of trail built, it has taken equal effort to plan, organize and promote the undertaking. The officers and board members of the Society meet four times a year for day-long sessions, and most of them also lead committees or projects that require one or more days of their time each month.

The Society's busiest committee of late has been that in charge of producing Bartram Trail maps, complete with trail descriptions and directions to trail heads. Led by club secretary Mo Wheeler, the committee has divided the trail into seven sections, each covering 10 to 14 miles; and in the past three years it has published maps of sections 1 through 5 from Rabun Bald to Nantahala Lake. Section 6, which takes the trail on to the historical marker in the gorge, is next. In recognition of these trail mapping efforts, the N.C. Department of Environment, Health and Natural Resources in 1992 awarded the Society a grant to help fund publishing costs.

In addition to these projects, the Bartram Trail Society holds two recreational and educational meetings a year—"Bartram Day" in May, and the "Annual Meeting" in October. Each of these events features a guest speaker and picnic, followed by guided hikes or canoe trips. In mid-October this year the organization will host its biggest event yet, the three-day Bartram Trail Conference, open to all, to be held at Fontana Village Resort. Bartramites from many states will gather to hike, learn about the natural history of the region, and see presentations by noted speakers on Bartram and the Cherokee.



WILLIAM S. LEA

***Flame azalea** is a fairly common plant along the route of the Bartram Trail, its blazing color a stark contrast to the deep shadows and relentless green of the Appalachian forests.*

Bartram never made it to the Overhill towns. Perhaps the warnings of the traders at Cowee began to prey on his mind, or perhaps the "dark shades" of the hemlock forest seemed to hold dangers. Whatever the reason, after meeting with Atakullakulla, Bartram pushed on west through "mountainous high country," growing more apprehensive the further he went, until,

> *upon serious consideration, it appearing very plainly that I could not, with entire safety, range the Overhill settlements . . . I suddenly came to a resolution to defer these researches at this time.*

Bartram retraced his route, first to Cowee, where he wrote some of the clearest contemporary descriptions we have of the Cherokee, then up the Little Tennessee. Still desiring to explore "primitive nature," he left the mountains and headed towards Fort James, in Georgia, where he hoped "to join a company of adventurers who were set off in July for Mobile."

Like Bartram, the society that organized to honor him—having reached the Nantahala Gorge with its trail—now faces "mountainous high country" to ascend if it is to reach its goal—the summit of 5,000 foot-tall Cheoah Bald, west of the gorge. From Cheoah Bald, on a clear day, the view goes all the way to the land once known as the "Overhill," where Bartram longed to range. This final section of the Bartram Trail will be the most difficult to construct, particularly the stretch leading up and out of the gorge. The organization is working now with the Forest Service to determine the best route, and its members are scouting the terrain. Soon, the North Carolina Bartram Trail Society will again take up the pulaski and the pick to "dig dirt and roll rock." ☐

Burt Kornegay is president of the N.C. Bartram Trail Society and is owner of Slickrock Expeditions, in Cullowhee. Readers wanting Bartram Trail maps and information about the N.C. Bartram Trail Society should write to Virginia Talbot, society treasurer, at P.O. Box 144, Scaly Mount., N.C., 28775. Maps are $2 each or $10 for a packet containing maps of sections 1 to 6.

Infrequent Flier

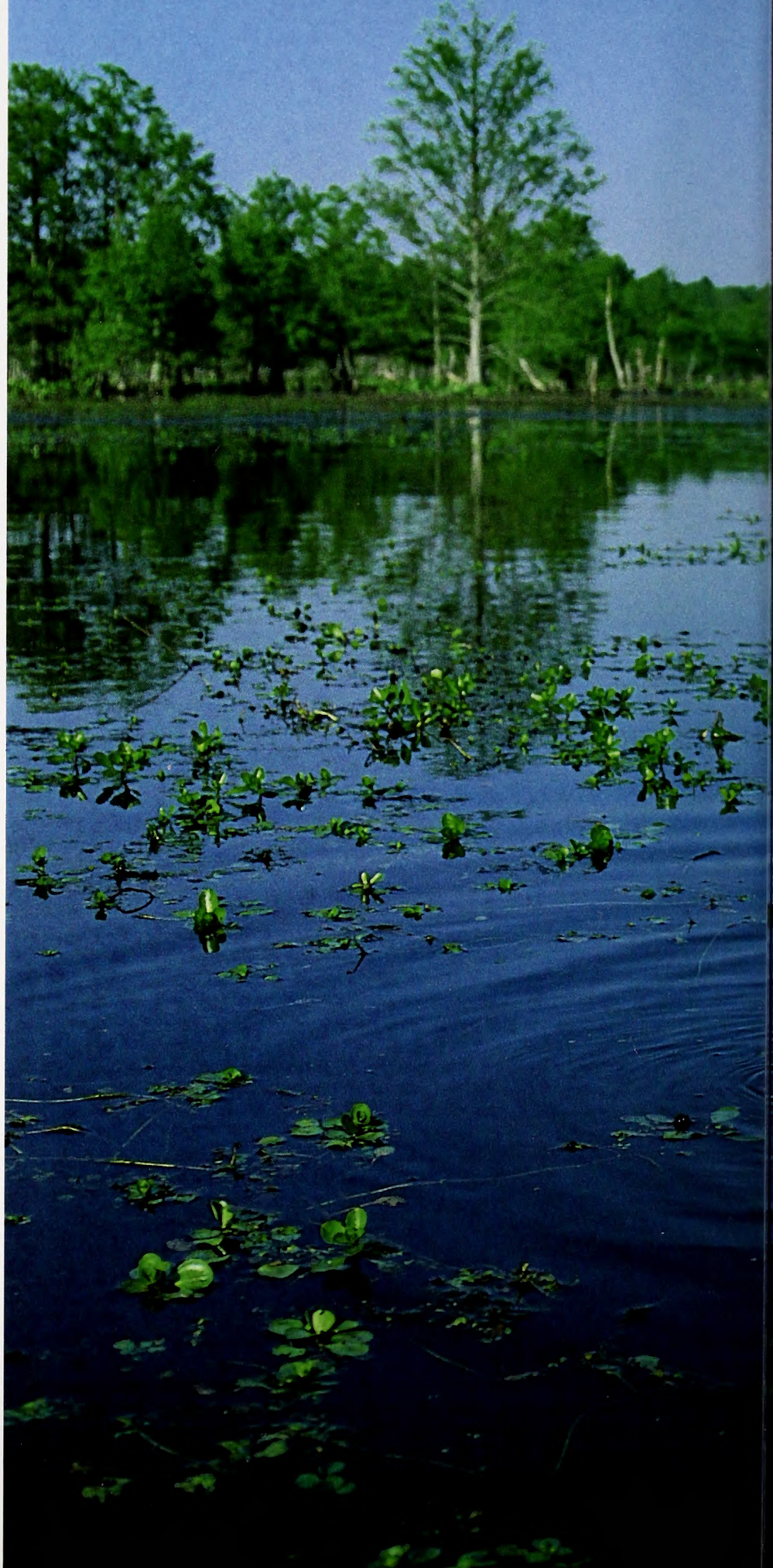
The blackwater rivers and millponds of the east are home to this shy and handsome sunfish. Maybe fishermen just haven't been properly introduced.

written and photographed by Eugene Hester ©1993

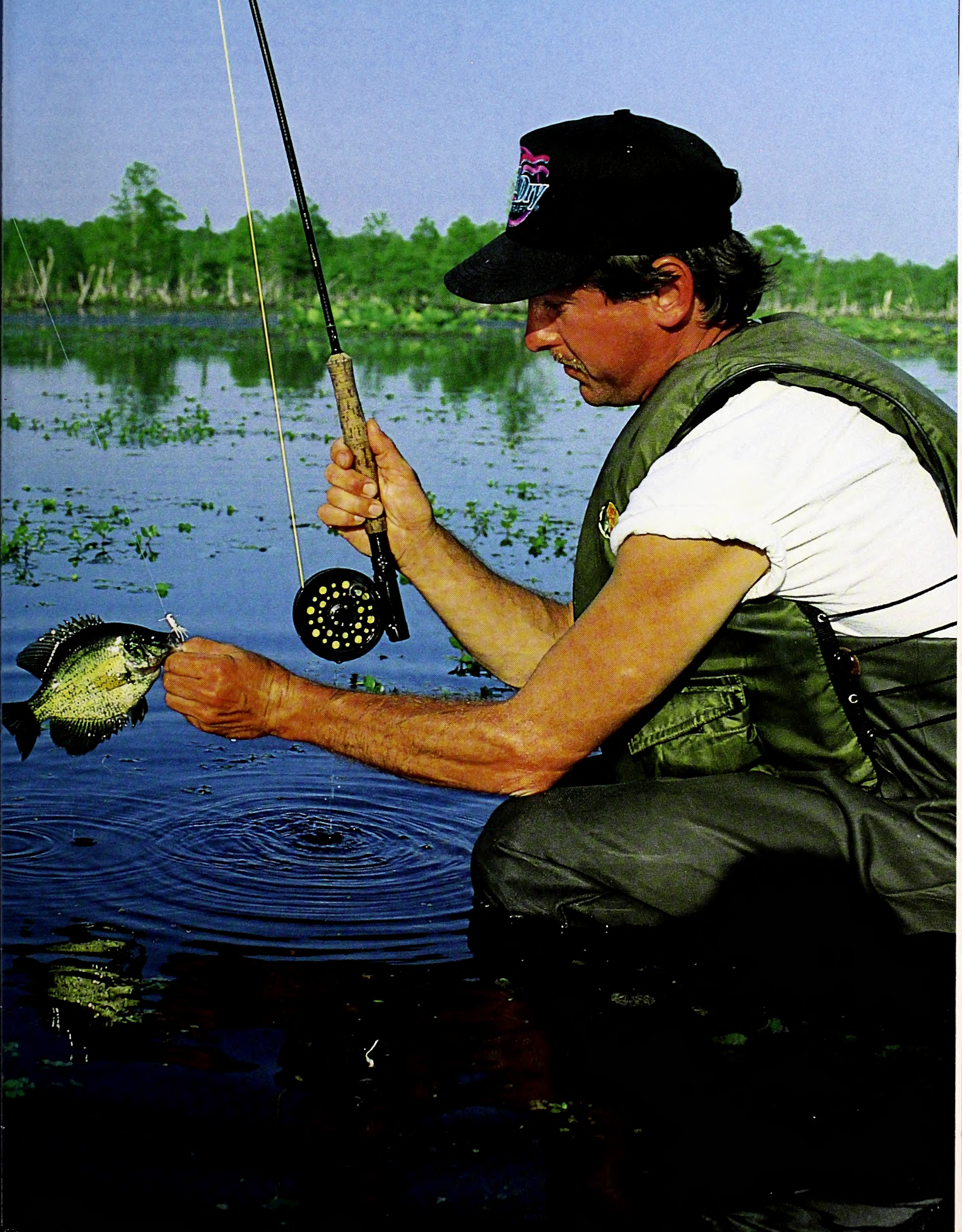
Sometimes I wonder whether I have imagined this fish called a flier. Mention catching a flier and even experienced fishermen usually say, "A what?" Even those few who recognize this fish often regard it as nothing more than a bait-stealing pest that seldom exceeds 3 or 4 inches in length.

Yet, over the years I have managed to find some populations of fliers 7 or 8—maybe even—9 inches long. This is a respectable size for any sunfish, and certainly big enough to provide great sport. Maybe one of these would even be a state champion if records were kept for this fish.

There *is* such a fish as the flier, and it is at home in clear waters that have a lot of vegetation and little or no current. Some old mill-



***Rick Jerman caught** this flier in a weedy lake in eastern North Carolina using a fly rod and a popping bug. These colorful sunfish are native and common in many waters, particularly in the eastern part of the state, but they aren't well known by most anglers.*



ponds provide ideal habitat for fliers and that is where I most frequently find them. At spots here and there—wherever suitable habitat exists throughout the eastern half of the state—fliers may be locally abundant. They are rare in farm ponds or open-water lakes, but fairly common in many swamps and creeks.

The flier lives in similar quiet lowland water habitats from Virginia to Texas, and along the Mississippi River drainage as far north as southern Illinois and Indiana. In North Carolina its range is essentially the eastern half of the state, east of the Yadkin River drainage, and it is particularly common in the black-water streams of the eastern Coastal Plain.

It is a deep-bodied, slab-sided sunfish with a generally olive-green coloration, though its sides are lighter with a silvery or somewhat brassy color. The scales on its sides have brown spots that form a series of horizontal lines. It also has a vertical dark streak below each eye, suggesting a stain from a teardrop. In appearance, a flier seems to be intermediate between a black crappie and a bluegill. Its size, shape, coloration, size of mouth and other features all seem halfway between these two.

The flier's anal fin is larger than in most other species, and is almost as large as its dorsal fin. Together these two fins give the fish a rounded appearance. Indeed, in some areas this fish is known as a round sunfish. In other places it is known as a millpond bream or flier bream. The dorsal fin contains 11 to 13 spines, and the anal one has seven or eight spines. Juvenile fish have a prominent orange-bordered black spot in the soft portion of the dorsal fin. These fish feed mostly on aquatic insects. Adults also eat small fish and crustaceans. When they are very young they feed almost exclusively on copepod crustaceans.

Years ago, Bill Hinnant, my good friend and fishing companion from Wendell, learned to catch fliers. Developing such a skill would be expected by anybody who knows him. Bill is a laid-back kind of guy who is always experimenting to learn new and better ways of doing things, and especially catching fish. He has invented a wheeled dolly (the Dinghy Dolly) for moving and launching johnboats and canoes; unique ways of attaching his trolling motor to his boat; and a way of adapting a spinning reel to a fly rod for fishing with a jig. He is always experimenting with lures, and he especially enjoys catching fish on lures his companions have abandoned as ineffective.

While exploring creeks, millponds and other places off the beaten track in his little 12-foot johnboat or his pirogue-type, homemade canoe, Bill found the right places for these fish. His experimentation with different

***These young anglers** proudly show off their catch, a crappie (left) and a flier (right). It is not unusual in winter to catch both species in deeper water, but while the schools may be in close proximity, they do not usually mix.*

***With its broad dorsal** and anal fins, it is easy to see why the flier is sometimes called the round sunfish. Fliers are particularly handsome fish, sporting lines of small spots and a golden color.*

lures and baits helped, too. Instead of always casting to the shoreline, he is just as likely to jiggle a lure along the lake bottom or between logs or in weedbeds.

Bill's equipment and interests make him right at home on little creeks and millponds. He rarely fishes the big waters where the bass boats go, and considering that the habitats he likes are the same ones favored by fliers, man and fish were destined to meet.

One day as Bill pulled a nice flier from between two trees in a cypress swamp, he turned to me and said with a smile, "You know, you can't catch a flier from a bass boat." So true.

Although Bill can catch fliers in any month, he has to vary his techniques considerably as the seasons change. In summer he uses wet or dry flies or small popping bugs on a flyrod, and fliers take these tiny lures at or near the surface with a lot of determination. The same artificial bugs used for bluegills work well, and the technique is similar, too. He casts these tiny bugs or flies into open-water areas near thick vegetation, and usually when you find one flier, there are others close by. Sometimes Bill also uses small red wiggler earthworms in the same areas with good success.

As the water cools in autumn, the fish move to deeper parts of the swamp. Swamp waters where fliers live are rarely more than 8 or 10 feet deep, but by the time Thanksgiving rolls around, these fish have moved to the deeper areas and are often concentrated only a foot or two above the bottom. Bill learned where these fish move for the winter, and he also learned another important habit: they gather in schools in winter, and there may be dozens to hundreds of them in a school. The difficult part, of course, is locating the school, but once Bill finds a school, he often catches a lot of fish.

On cold days, fliers will be suspended just above the pond bottom, but on warmer days they may move nearer the surface. Often they will school near crappies. We have found, however, that the two species mostly cluster with their own kind. For example, in one of our favorite swamps, when fishing in 8 feet of water, the fliers may be at 7 feet and the crappies at 5 or 6 feet.

For winter fishing we have one favorite natural bait and one favorite artificial lure. The bait is a small minnow—the smaller the better. In fact, if it is over 1 1/2 inches long, it may be too large. It takes too long for the fish to swallow it. With a tiny minnow, however, the fish swallows it in one swift gulp and can

be hooked quickly. Bill and I have learned that we usually need to catch our own minnows for two reasons. A lot of bait stores don't have minnows in winter and, when they do, the minnows are usually too large to use as flier bait. Fortunately, we have access to a couple of good farm ponds that hold a lot of small gambusia mosquito fish in the very shallow headwaters. A couple of quick passes through these areas with a minnow seine usually produce all the tiny minnows we need for our trip.

The artificial lure we almost invariably use is a small jig. Those with a plastic or feather tail and a lead head work best. Our favorite is a yellow or white Bett's glitter grub. It has a lead head, soft plastic body and maribou feather tail. The 1/16- or 1/32-ounce size is small enough for the fish to grab readily, yet it has enough weight to get down quickly to the depth of the fish.

To fish these jigs properly, we make small movements of the rod tip to create a slight, vibrating action that causes the maribou tail feathers to move in an undulating motion. This gives the jig the appearance of something alive and swimming, and that's critical.

Though small minnows and small jigs both work well, we continue to be amazed by the fact that on one day minnows work better and on other days jigs are definitely better. At first I was skeptical that such differences really existed, but we have experienced this so often, and the difference has been so dramatic, that I no longer have any doubts. We have never been able to predict which will be better for a given day, so we try both and use the tactic that works best.

We can catch fliers throughout the winter, but we first have to find them. We cast jigs and troll minnows to locate the fish, and we have found over the years that fliers tend to school at the same locations in these swamps year after year. Still, they do move around some.

From one day to the next, the school might have moved 50 to 100 feet, so we usually start where we last found them and work outward in ever-widening circles until we find them again. Sometimes we don't find them at all, but uncertainty is part of the challenge.

When we don't find them, Bill usually offers a little homemade conservation philosophy. "If we caught them every time, fishing would be less of a challenge," he says. Also, we might overharvest them and thus ruin our favorite fishing holes. Such an attitude puts a positive turn on an unsuccessful fishing trip, but some of us would just as soon catch fish.

***Bill Hinnant caught** this flier in cold weather on a jig fished in the deeper water of an old millpond. He has learned that fliers tend to school up in winter much like crappies.*

One February day as I prepared to go to my favorite millpond swamp to fish for fliers, a light snow was falling. Though it was cold, the swamp was not frozen so it still was possible to get to the right spots in my johnboat. I called my brother William to invite him along, though I really doubted that he would go in such weather.

"Let's go to the millpond and catch some fliers," I said.

"Boy, don't you know it's snowing?" he responded with a suggestion of disbelief in his voice.

"I remember once you told me that you, Dad and Jed Faison were catching crappies in Lake Myra when it was snowing," I replied, egging him on somewhat tongue-in-cheek.

"Yeah," he replied, "but it wasn't snowing when we went up there."

I went ahead without him, of course, and had a very successful trip catching about 30 fliers and crappies. I carried the fish by his house to show them to him, then cleaned them in his garage. The next day I fished again at the same place, but couldn't find the school of fish.

I again called William, telling him I had fished in the same spot as the day before, but this time without success.

He responded with his usual down-to-earth savvy. "I reckon they figured that was not a very safe place."

Winter-caught fliers have an outstanding flavor, and are simply delicious when filleted, rolled in corn meal and deep-fat fried. Maybe one reason winter-caught fliers taste so great is that it usually has been weeks or months since I last ate fresh fish. Also, good winter water quality and the fact that the fish are in ice water from the time they are caught right up until they are cleaned may play roles.

***Lying side-by-side,** it is easy to see the differences in color and shape between a flier (top) and a crappie, but while crappies are among North Carolina's most popular gamefish, fliers have escaped the limelight.*

Fishery biologists age fish by magnifying and reading the rings on fish scales similar to aging a tree by its rings. Studies made of fliers indicate that fish 6- to 8-inches long are 5- to 7-years old. Nesting takes place in spring somewhat earlier than bass and considerably earlier than bluegills. It may start as early as March, and nests can almost always be found by April and May. Usually fliers spawn at about the same time as crappies. The males construct clusters of saucer-shaped nests similar to crappies, bluegills and other members of the sunfish family.

Fliers are interesting and handsome fish, and they are cooperative year-round, even when other species become inactive. Yet, perhaps most of all they are pure natives that are a bit unusual—and prized all the more for those qualities.

Still, you may have to find your own favorite spots. If you see Bill Hinnant around Wendell, ask him about his favorite fishing holes for fliers. Ask him where he catches the fliers, and he will give you his ready answer.

"Right in the side of the mouth." ☐

Marine Copters Used in Operation

Stranded Striped Bass Rescued on Roanoke River

Written and Edited by Vic Venters

When military intervention is mentioned these days, the Roanoke River in northeastern North Carolina isn't a location that immediately springs to mind. In mid-May, however, helicopters from the U.S. Marine Corps took part in an operation to rescue striped bass when falling water levels in the river left the fish stranded in isolated potholes below Roanoke Rapids dam.

A helicopter was used to airlift a N.C. Wildlife Resources Commission boat into potholes below the Roanoke River Dam. The trapped bass were electroshocked using the boat, then airlifted in 200-gallon containers to a location at Weldon, where they were returned alive to the Roanoke.

The unique rescue effort was a joint operation between the Northeast Action Wildlife Club, the Marine Corps, the Wildlife Commission, the U.S. Fish and Wildlife Service, N.C. State University and North Carolina Power.

BODIE McDOWELL

Striped bass populations in the Roanoke have declined severely in recent decades, a problem thought to be caused in part by fluctuating water releases. In 1987, hundreds of striped bass perished when water levels were lowered and spawning striped bass were left stranded in potholes in the old river channel below the dam. The same stranding disaster was expected this spring as the U.S. Army Corps of Engineers was scheduled to reduce water levels flowing from Kerr Dam in mid-May.

Because of heavy rains in early spring, dam flood gates were opened in April, inundating the old river channel below the dam, thereby allowing striped bass to swim up it. Because of dryer weather and falling lake levels in late April, however, the Corps of Engineers scheduled a decrease in water flow that would dry up the temporarily flooded old river channel. Wildlife officials and members of the Northeast Action Wildlife Club feared the worst.

BODIE McDOWELL

***A Marine helicopter** prepares to lift containers holding striped bass as part of a rescue operation of stranded bass in the Roanoke River. The helicopters ferried the bass from potholes where they were trapped to release sites downriver. District 1 fisheries technician John Copeland (below) nets one of the rescued fish before its release.*

The idea for the rescue effort came about after Curtis Donaldson, president of the Northeast Action Wildlife Club in Roanoke Rapids, contacted Eugene Price of Goldsboro, then vice chairman of the Wildlife Commission. The men agreed that a fish rescue was needed, but rough terrain around the dam would hamper any efforts by land. Price then approached U.S. Rep. Martin Lancaster with a novel solution: fly in help with Marine helicopters.

"I had seen Marine Corps helicopters lifting howitzers and other heavy equipment during training maneuvers," said Price. "It occurred to me that they could transport a boat into the potholes. I called the Corps and they said it would be a worthy project, as well as being a good training exercise."

With Rep. Lancaster's help, two helicopters were dispatched from the New River Marine Air Station near Jacksonville. A date was coordinated with the Corps of Engineers when the helicopters, Northeast Action Wildlife Club volunteers and wildlife officials would be available.

Assisted by the Marine helicopter and their crews, 50 volunteers, biologists and enforcement officers began the rescue on Monday morning, May 10, as water began to fall. In all, 94 striped bass were rescued, many of which were adult females. Six of the female stripers weighed more than 20 pounds and one weighed 28 pounds.

"There are very few of these older females left in that population," said Frank McBride, program manager for the Wildlife Commission's Division of Boating and Inland Fisheries. "The eggs from these older females are more likely to hatch and survive than those of younger stripers, so these fish are valuable breeders. That 28-pound fish probably had 2.5 million eggs in her. It's important that we save them."

In addition, several largemouth bass weighing between 8 and 10 pounds were rescued, as was a 12-pound walleye and many other gamefish. "We had 10 volunteers give up a day's pay and work to take part in this rescue effort," said Curtis Donaldson. "The striped bass in this river are in trouble, and I'd like to think we've helped save part of this valuable resource."

Presented by N.C. Wildlife Federation

Wildlife Commission Employees Win Conservation Awards

Three current N.C. Wildlife Resources Commission employees, and one retired employee, took home awards from the N.C. Wildlife Federation's state convention early this spring.

Master Officer Frank C. Couch was honored as Wildlife Officer of the Year; education specialist Anne K. Hice of Pleasant Garden was honored as Conservation Educator of the Year; and fishery biologist Scott Van Horn was named Wildlife Conservationist of the Year.

Wayne Bailey of Milton, the wild turkey project leader for the Wildlife Commission before retiring in 1980, was inducted into the Federation's Conservation Hall of Fame.

In addition to the Federation award, Officer Couch also received Officer of the Year awards from the Southeastern Association of Fish and Wildlife Agencies and from Shikar Safari International.

Officer Couch posted a 100 percent conviction rate for the 142 citations he issued for fishing-related violations over a one-year period in 1991 and 1992. He led Wildlife District 3 officers in night deer-hunting arrests for the third straight year. On a volunteer basis, Couch is serving on an operation Big Sweep committee in Johnston County and is taking a course in Spanish to better comunicate with the large number of Spanish-speaking people who live in the county.

Anne Hice received her award for outstanding accomplishments for teaching educators about natural heritage education and teaching school children about the waters, woods and wildlife of North Carolina. She was instrumental in getting retired stock car driver Richard Petty involved in the conservation movement.

In a letter of nomination, Hice was praised as a person who doesn't look to get her name in big print, but quietly works behind the scenes.

"She never worries who gets the credit, but if you look for the behind-the-scenes worker, that's where you will find her," wrote the nominator.

Scott Van Horn is well known for his work in Piedmont North Carolina reservoirs with largemouth bass, striped bass, Bodie bass and crappie. His evaluations of these species have led to important changes in size and creel limits. He has also spent much time working on the development of minimum stream-flow guidelines to assure that streams of the state will remain viable aquatic habitats for fish and other aquatic species.

Eight other officers were presented Wildlife Officer of the Year awards in their respective districts. They were: Master Officer James M. Mead of Coinjock, District 1; Master Officer Milton R. Jones of Simpson, District 2; Master Officer Brenton M. Spivey of Lumberton, District 4; Sgt. Jay A. Rivenbark of Stem, District 5; Master Officer Timothy W. Sisk of Mills River, District 6; Master Officer Jimmy D. Boles of Rural Hall, District 7; Sgt. Tony Robinson of Valdese, District 8; and Master Officer Robert B. Fullbright of Bryson City, District 9.

—Bodie McDowell

BODIE McDOWELL

***Three N.C. Wildlife Resources Commission employees** took home awards this spring from the N.C. Wildlife Federation's annual convention and awards banquet. Pictured from right to left are: Scott Van Horn, Wildlife Conservationist of the Year; Master Officer Frank Couch, Enforcement Officer of the Year; and Anne Hice, Conservation Educator of the Year. John F. Lentz of Ellerbe presented the awards. Lentz, who serves on the board of directors for the N.C. Wildlife Federation and as a regional director for the National Wildlife Federation, was appointed in May as a wildlife commissioner.*

Calendar

On several occasions, events in this calendar have been changed without notice. Readers should check the contact before traveling to an event.

August 12-13

A workshop and field tour titled "Longleaf Pine Ecosystem Restoration in North Carolina's Coastal Plain" will be held in Kinston. Discussions of longleaf ecosystems will be presented. For more information, contact Ann Couglin, Educational Outreach Office at (919) 515-3184.

For Use on Game Lands

Group Builds Wood Duck Boxes

VIC FRENCH

The Lighthouse PFWB Church *"Royal Rangers," outpost 32, of Pin Hook constructed 13 wood duck boxes this spring and donated them to the N.C. Wildlife Resources Commission. Each young man above was responsible for the construction of a nest box. The boxes will be placed on public game lands in eastern North Carolina.*

Wildlife Endowment Fund Report

April 1993

Principal Balance
$18,116,987.30
Interest Earned
$11,469,324.93
Total Receipts
$29,586,312.23
Interest Used
$4,123,817.48
Fund Balance
$25,462,494.75

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

Out of Control

by Vic Venters

Heavy growths of noxious aquatic weeds often appear in farm ponds in late spring and summer. The problem is worsened by agricultural runoff, when livestock waste enters a pond, or when pond water is too clear, allowing sunlight to reach the bottom, thus encouraging the spread of filamentous algae and aquatic weeds.

Fishing usually suffers in weed-clogged ponds, and swimming and irrigation uses can be limited. In addition, when vegetation is dense, bream and other sunfish often become overcrowded and stunted because the weeds prevent bass from effectively preying on them. More serious problems are fish die-offs in hot weather, as decaying algae strips oxygen from the water.

The good news is there are several methods for controlling aquatic weeds, including fertilization or chemical treatment with aquatic herbicides. The bad news is that it's too late to use them this summer if you've already got these weeds. Applying fertilizer in the summer to ponds with established weeds will only increase the amount of vegetation. And by applying aquatic herbicides now, you risk fish kills because of oxygen depletion from decaying algae.

It's best to wait until early next spring to try fertilization or chemicals. However, a feasible weed-control alternative for summer is stocking sterile triploid grass carp. These carp eat only weeds and have proven effective in controlling some types of aquatic vegetation. Because grass carp are vulnerable to bass, stocking fish larger than 8 or 9 inches is recommended in ponds with existing gamefish populations. Mid- to late summer can be a good time to stock fingerling grass carp because the aquatic vegetation will allow the smaller carp to hide from predators.

You must obtain a permit from the N.C. Wildlife Resources Commission before stocking over 150 grass carp. Under that number, no permit is required. About 10 to 15 carp per acre is recommended.

If you decide to fertilize your pond later on, consult your district fisheries biologist, a Cooperative Extension Service agent, or the *Pond Management Guide* booklet, produced by the Commission and the Extension Service. Improper fertilizing or over-fertilizing a pond can create more problems than it solves.

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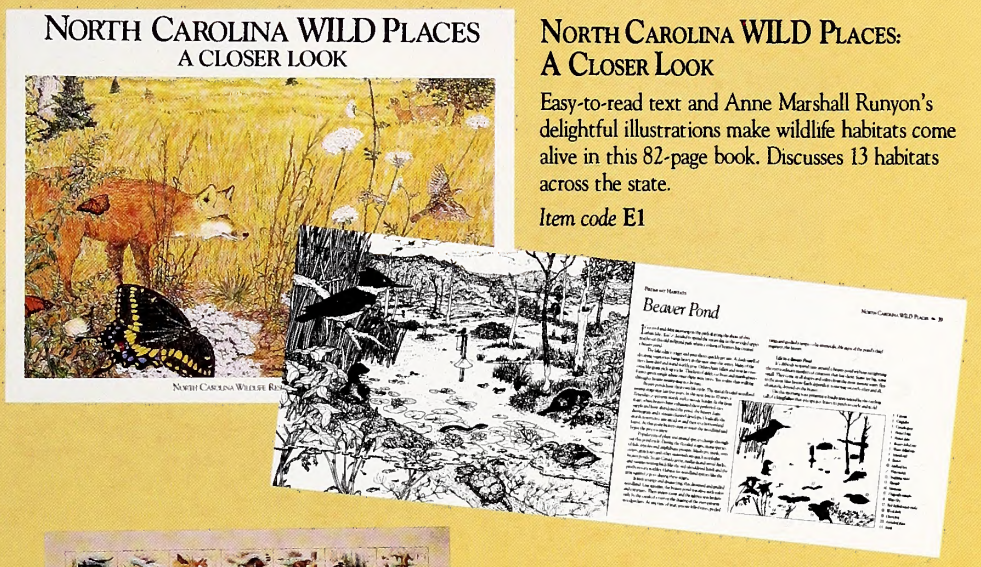

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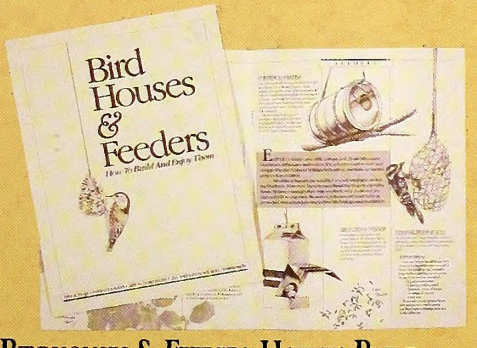

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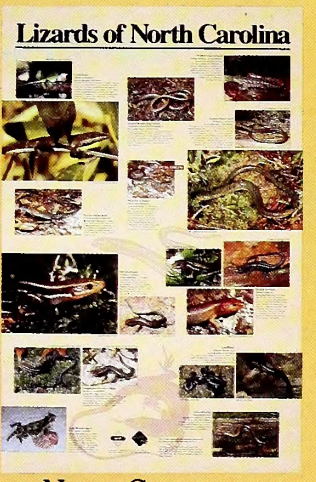

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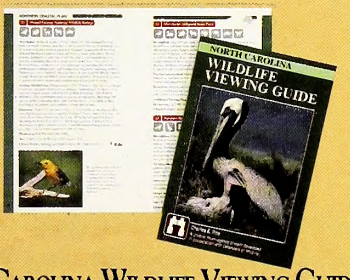

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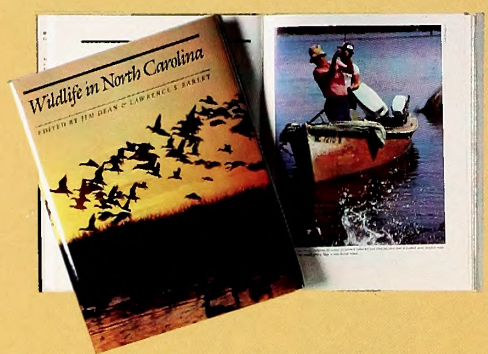

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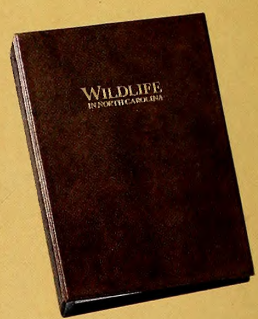

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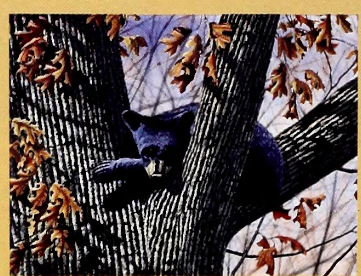

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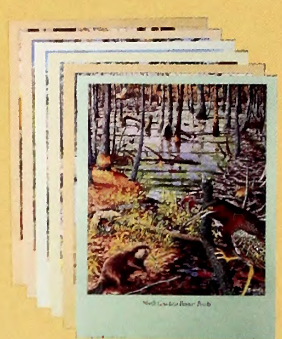

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painting by Bruce Miller

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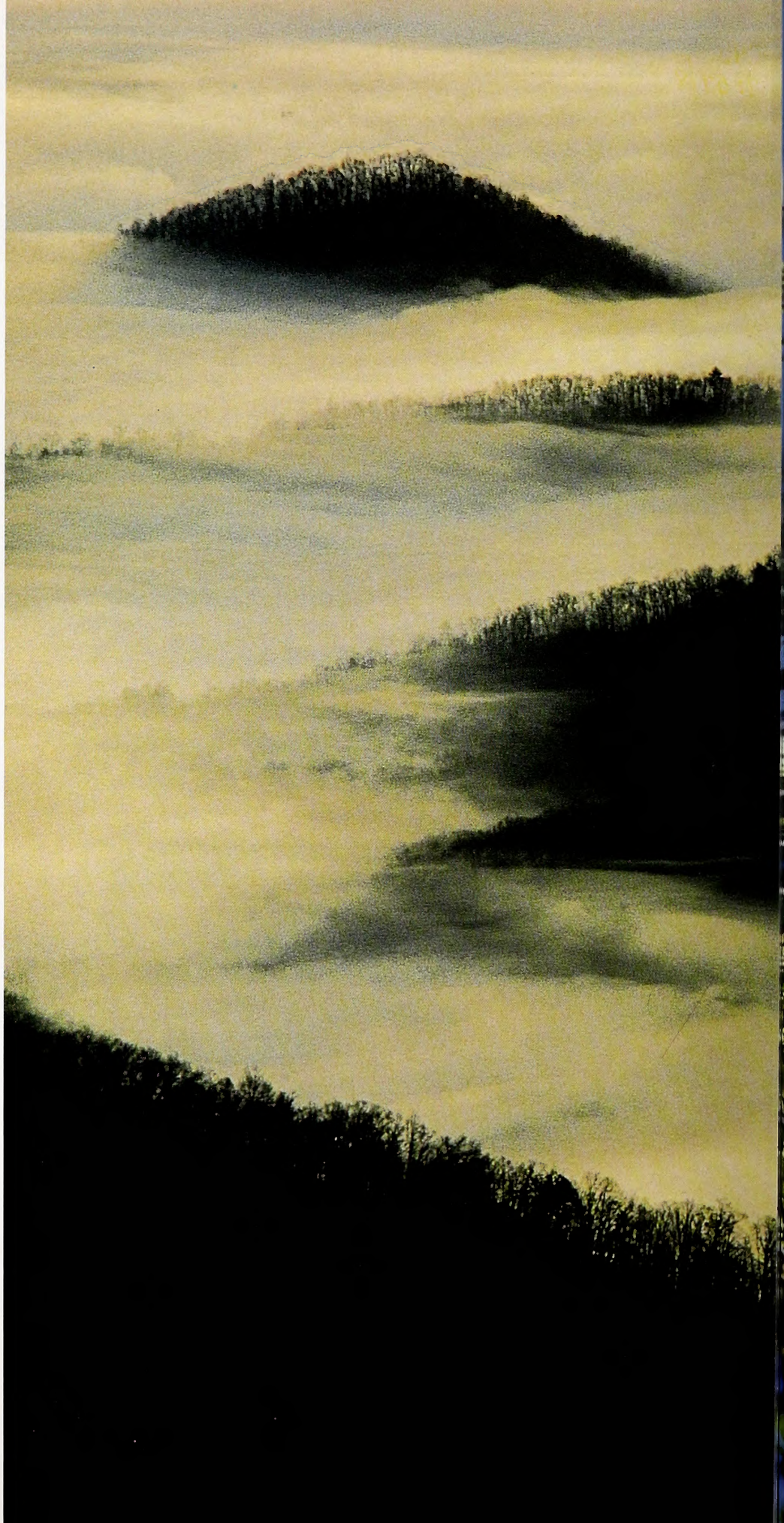

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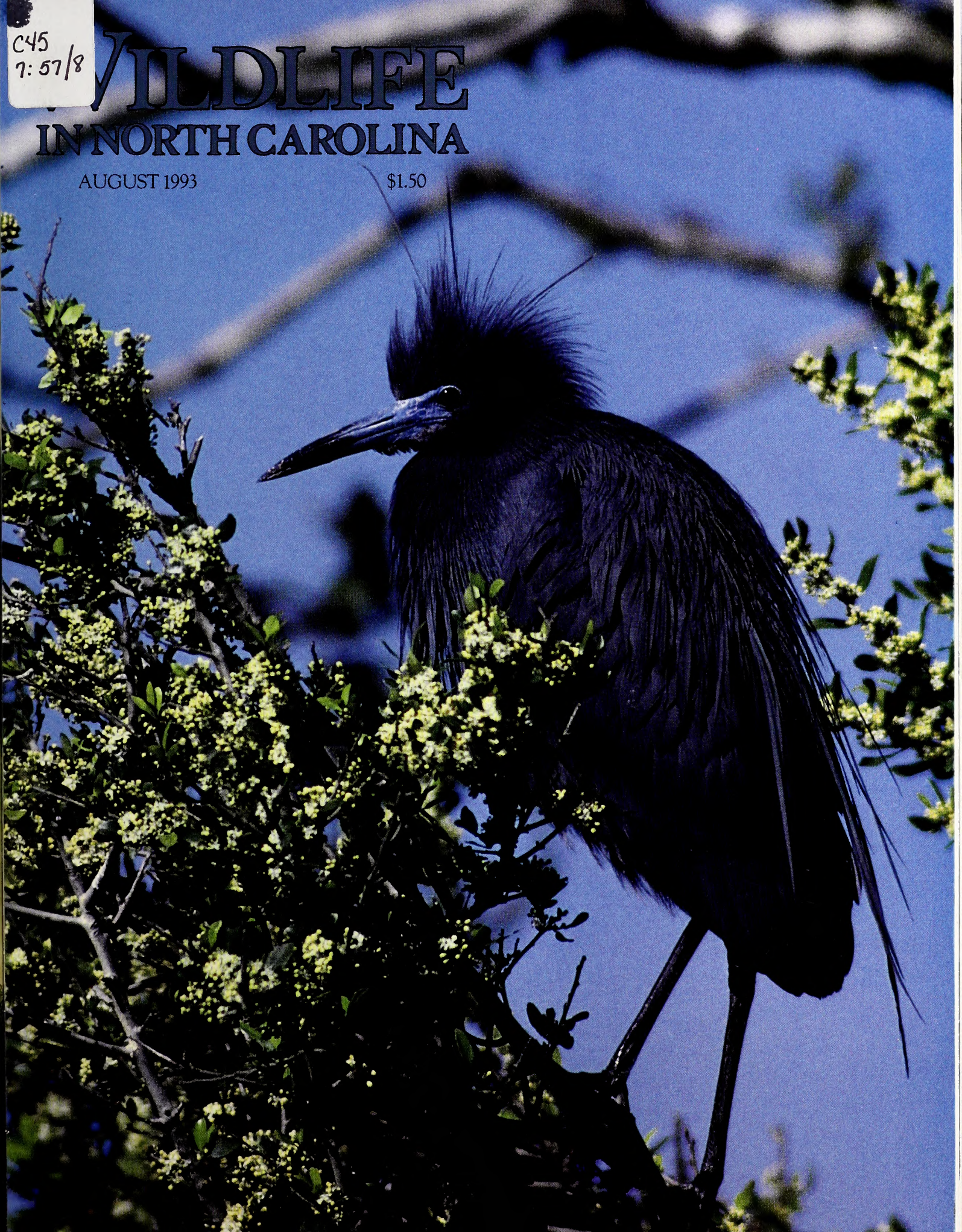

The Summers Before Air

by Jim Dean

We complain about the heat this time of year, but it could be just habit. With homes, malls, theaters, work places and vehicles all air-conditioned, many of us don't spend 10 minutes a day outside anymore. Everywhere we go, that ever-present hum holds the season at arm's length. Of course, those who haul irrigation pipe in tobacco fields or spread tar on roofs could tell us what we're missing, and no doubt would, given half a chance.

I suspect development of air-conditioning has had more to do with the explosive growth and change in the Southeast over the past 25 years than anything else. But aside from that debatable merit, we'd probably vote to keep it.

ILLUSTRATED BY JACKIE PITTMAN

Lately I've been getting reacquainted with the miseries and delights of summer—summer as it was in the early 1950s. My time machine is a three-room clapboard house that has been sitting abandoned and covered with vines in the middle of a field for as long as I can remember. I vaguely recall seeing children playing in that yard when I was a child, but that was over 45 years ago. I don't know when it last had windows or doors, or if it had ever been painted.

Only wasps, dirt daubers and a 6-foot black snake lived there two years ago when, on a whim, I pushed through the catbriers, Virginia creeper and cow itch and went inside. Scattered about were pieces of farm equipment and fertilizer sacks. The walls were unpainted pine, but were basically intact except where someone had fired buckshot through the open back door leaving a nice pattern beside the chimney. There were two rooms downstairs and a narrow stairway leading to a loft. The floors were solid. As I stood in an open upstairs window and looked out across the farm, a bobwhite whistled in the hedgerow. What a wonderful place, I thought.

I continued to think about it as I drove home. Could be a good getaway. No need for electricity or water. Might add an outhouse later. Would need seven windows, two doors, maybe a porch on the front. No, make that two porches, front and back. A hammock swung on the back porch would overlook the pond. Should check the tin roof and flues. Wonder where I could find an old wood cook stove? Buy wasp spray, I wrote on a notepad.

A few months later, it was basically finished and filling up with castoff furniture. Aside from being a good fishing and hunting camp, it has reminded me of just how little we really need. And it has given me back my barefoot summers.

"You can't stay there in July and August," I was warned. "You'll stifle." I thought so, too, but people who built houses before air conditioning took in mind certain considerations, such as cross-ventilation and orientation to prevailing winds. A breeze is as reliable as the trade winds in these thermal-sensitive fields, and the downstairs is often comfortable even when the temperature is 95. In the early morning, it is often cool enough for a light quilt. Even the heat from the wood cook stove is tolerable from 4 a.m. until an hour after sunrise, but it is easy to understand why lunches long ago were often leftover breakfast biscuits and cold, roasted sweet potatoes.

The body adjusts its thermostat. Washed in gentle airs and unassaulted by humming fan or compressor, summer reappears in the half-wakefulness of an afternoon nap. You can feel it stirring the hair on your arms, hear it in the top of the cedar where the mockingbird sits, or smell it in the gardenia and sweet betsy outside the window. I dream of kin long gone, sitting on porches in cane-bottomed chairs, shelling peas into pans that rest on aprons across ample laps. I can hear the rattle of ice as the crank turns, and the water, milky with salt, pours from the drain on the side of the wooden tub. "Thee makes the best ice cream, Anna Mary," someone is telling my Quaker grandmother as we wait in the shade of a huge oak for our turn to lick the dasher.

A young boy in khaki shorts is walking up a sandy road beside a huge cornfield in the shimmering heat. He is carrying an air rifle in one hand and a twin orange Popsicle—sucked nearly white—in the other. The melt is dripping off a sticky elbow. At noon every day, he waits for the steam train to cross the road at the end of the field. The corn rattles lightly as he sits in a swarm of gnats.

I awake and sit up in a blind daze until I realize that I am not 10 years old, and no train is coming. Outside, the shadows are long, and Fowler's toads and bullfrogs are singing at the pond's edge. Soon the fireflies will gather their random sparks until thousands of them pulse together over the fields and along the edge of the distant woods. I have waited too long to fish, but no matter. Summer is ripe, and I need only move from the sofa to the hammock on the porch to continue the harvest.

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and also to the environment we share with them.

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Wildlife Through the Year *by Vic Venters*

Cover *While neither threatened nor endangered, the little blue heron's populations are dropping. Photographed by Ken Taylor.*

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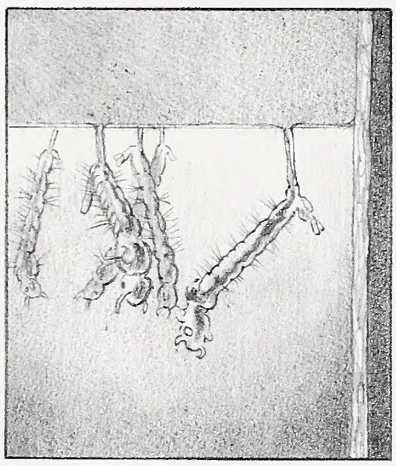
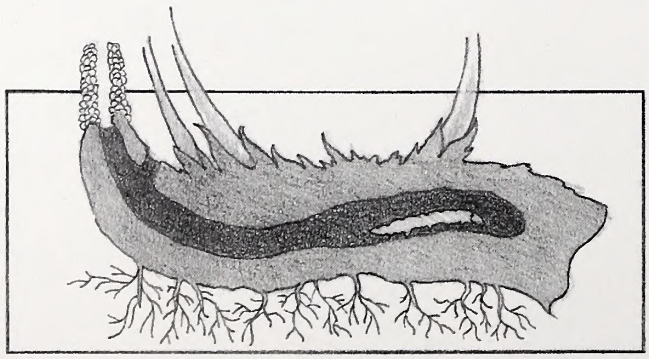


Hanging *from the surface of the pool are tiny mosquito larvae that feed on insect remains, bacteria and other foods.*

A small wasp *uses yellow pitcher plants for its nursery. It lays its eggs on alternating layers of grass and paralyzed crickets and grasshoppers. The hatched larva feeds on the bodies of the insects.*



A root-boring caterpillar *often feeds within the rhizome of many yellow pitcher plants. Small pieces of plant debris form tubes on the ground surface at the entrance of the caterpillar's burrows.*

Illustration source: Carol Lerner, *Pitcher Plants: The Elegant Insect Traps*, (William Morrow, 1983).

Life in a Deathtrap

written by Lawrence S. Earley/illustrated by David Williams

For many insects, there's hardly a more perilous environment than the inside of a pitcher plant. Lured by the plant's sweet nectar, they eventually fall into the pool at the bottom and drown. Yet for some insects, the pitcher plant is not only their home, but their only home.

One insect burrows into the pitcher plant's rhizome, a few inches below the surface, where it eventually pupates and emerges as an adult. Another insect, a small wasp, builds a nest for its eggs inside pitcher plants, creating layers of grasshoppers and crickets on which it lays its eggs. The hatched larvae feed on the bodies of the 'hoppers.

For several small scavenging insects, the pool at the bottom of a pitcher is an inviting and nutritious gumbo of trapped insect carcasses and even small frogs. Many of these scavengers seem to be immune to the digestive action of the liquid. The maggots of a flesh fly hang from the pool surface and feed on rotting bodies; midge larvae eat what falls to the pool bottom; bacteria feed on the remnants; protozoans feed on the bacteria; and mosquito larvae, also hanging from the pool surface, feed on remnants, bacteria and protozoans.

Most astonishing of all the insects associated with pitcher plants, perhaps, are three moth species of the genus *Exyra* that are adapted to pitcher plants in several remarkable ways. One moth species carries out its entire life in and around the purple pitcher plant (*Sarracenia purpurea*), while a second lives nowhere else but the yellow pitcher plant (*Sarracenia flava*). The third can live in a variety of pitchers.

What these moths have in common is an instinct to lay their eggs within the pitchers. When the eggs hatch, the small caterpillars gorge on the inside walls of the pitchers and protect themselves from the elements by closing up the mouths of the pitchers with webs.

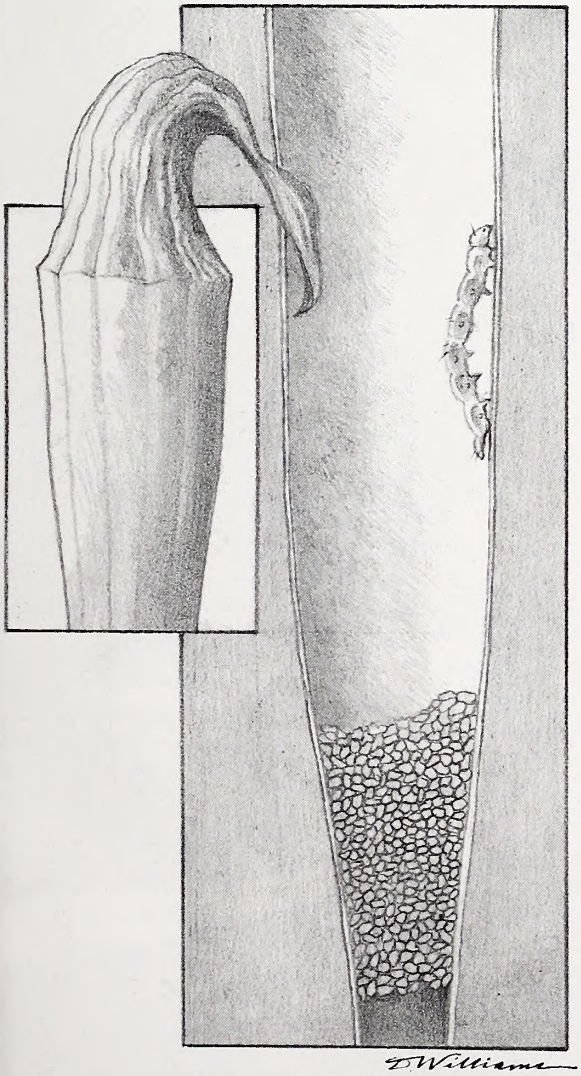
Yet more interesting by far is the behavior peculiar to each moth species, behavior that may well be dictated by the structure of the plants they are adapted to.

For example, the moth (*E. fax*) adapted to the purple pitcher plant lays a number of eggs—as many as 15—within a single tube, while the moth (*E. ridingsii*) adapted to the yellow pitcher plant lays only one egg per chamber. Biologists say that the difference may be due to the plants' structures. Because the purple pitcher plant grows low to the ground and bristles with pitchers, the larvae of *E. fax* can scatter to vacant pitchers quickly, so that only one larva is present per pitcher. But the yellow pitcher plant's tall and separated pitchers prevent the *E. ridingsii* larvae from moving from chamber to chamber without exposing themselves dangerously to predators. Thus that moth lays its eggs singly.

For similar reasons, the larvae of each moth prepare for hibernation in quite different ways. Low to the ground and open to winter rains, the fluid-filled pitchers of the purple pitcher plant are vulnerable to freezing. Its moth larvae solve this problem by chewing a groove around the plant's inside wall, causing the portion above the groove to collapse and harden into a protective cap. On the other hand, the tall yellow pitcher plants normally die to the ground each winter and split, a problem the *E. ridingsii* larva solves by creating a hibernating chamber in the bottom of the pitcher within the debris caused by its feeding.

Thus the pitcher plant is a complete microhabitat, each with a diverse food web of tiny insects possessing wondrous adaptations that enable them to flourish, even in the deadly world of a carnivorous plant.

The lethal, *elegant pitcher plant lives by trapping insects within its hollow chambers. Once insects are lured inside, the pitcher's smooth waxy walls and downward-pointed hairs prevent most from escaping. Yet despite the dangers of this environment, a community of insects thrives inside.*



To protect itself *while it grows, one moth larva chews a groove around the inside wall of the yellow pitcher plant. This causes the top to collapse, creating a hardened cap. Caterpillars of other moths weave a ceiling of silk across the pitcher mouths. Debris from the caterpillar's feeding fills the tube at the bottom.*

Observations from Swift Creek

KEN TAYLOR

Rising in Vance County and flowing southeast to the Tar River in Edgecombe County, Swift Creek harbors an incredibly rich diversity of wildlife, some of it endangered.

by Vic Venters

It is not so easy to love the small streams and rivers of populous Piedmont North Carolina. At least it's not easy for a naturalist. Most of these streams are long sullied by human hands; pumped in, dammed up, dumped on, as a class generally as abused as were peasants in the 13th century. First came the mills, then towns, now cities, all thirsting for water to fuel the growth that is our American Dream.

Over the last three centuries, the creeks, streams and rivers between mountains and coast have been our travel routes, power sources, waste receptacles and irrigation ditches. Now, ironically, they are needed for future municipal water supplies. In many cases their biological diversity—the native critters and plants unique to each waterway—have been gone so long we don't even know what's missing.

There are exceptions. Swift Creek in north-central North Carolina is one—perhaps *the* most important one. Federal and state nongame biologists call it "possibly the most significant lotic creek ecosystem remaining along the Atlantic Seaboard." In plain language, that means the waters and surrounding woods of the Swift Creek subbasin are home to an astounding variety of rare and unique plants and animals—in some cases globally unique creatures.

Nongame biologists *Chris McGrath (foreground) and John Alderman search for native mussel shells at a muskrat midden on Swift Creek. The middens mark the locations where muskrat have feasted on mussels. The presence of native mussels in a midden helps biologists determine the prevalence of various mussel species in the stream.*

Swift Creek rises as Sandy Creek just south of Henderson in southern Vance County. On its way to confluence at the Tar River, it slices through pine plantations, corn fields, cow pastures and hardwood forests through Warren, Franklin and Nash counties. In Edgecombe county, it enters the Coastal Plain and meanders through bottomland hardwood and cypress forests for some 30 miles before spilling its waters into the Tar River just above Tarboro.

Through the eons, Swift Creek has been indirectly associated with larger river basins: the James, the Roanoke, the New and Tennessee rivers. Through zoogeographic events, known as stream captures, rivers and streams changed course over the centuries as landscapes evolved and sea levels rose and fell. In the process, watersheds would merge, separate and migrate, only to merge with another river or stream. This has given Swift Creek an extraordinary variety of aquatic life forms, some associated with the Mississippi River basin, and some completely unique to North Carolina.

Swift Creek is home to the world's only viable population of the federally listed endangered Tar spiny mussel (*Elliptio steinstansana*), and it has the state's best populations of three candidate species for federal listing: Atlantic pigtoe (*Fusconaia masoni*), yellow lance (*Elliptio lanceolata*) and yellow lampmussel (*Lampsilis cariosa*). In aggregate, Swift Creek contains the state's best populations of six species of freshwater mussels, and contains at least 14 species in all, maybe more when all the sorting is done.

And that's only counting mussels. Swift Creek is also rich in aquatic insects, seven species of crayfish, 13 species of aquatic snails, five species of aquatic clams, and scores of amphibians and reptiles. About 60 freshwater

KEN TAYLOR

Close-up of a *muskrat midden. Scattered among the elliptical-shaped native mussels are the roundish shells of* Corbicula fluminea, *also known as the Asiatic clam. This introduced, pollution-tolerant species is proliferating in many North Carolina streams where native mussels are declining.*

KEN TAYLOR

Freshwater mussels, *such as these common elliptio mussels* (Elliptio complanata)*, can be excellent indicators of water quality because they are extremely sensitive to toxic substances during all their stages of life. Common* Elliptio *mussels are abundant in Swift Creek.*

and anadromous fish have been documented in its waters. Among this plentitude are two state-listed amphibian species, including the unique Neuse River waterdog, an amphibian found only in North Carolina, and two fish species of special concern.

Swift Creek's biological treasures are not confined to the water. Its woods and forests are made up of 10 different natural community types, and they hold seven rare plant species. Its bottomland hardwood forests provide excellent habitat for waterfowl, neotropical migrants and other songbird species, and it hosts healthy deer and wild turkey populations.

Because of its global ecological value, biologists at the N.C. Wildlife Resources Commission have asked that Swift Creek be listed as a Critical Habitat Area, one of 34 rivers and watersheds nominated in the state. The Critical Habitat designation would, if implemented, make a stream and its wildlife eligible for more stringent pollution controls and protection strategies, such as designation as a High Quality Water. The U.S. Fish and Wildlife Service, likewise, has made Swift Creek and her tributaries a priority stream for protection.

To the untutored eye, there is visually very little to separate Swift Creek from any other small Piedmont stream: mud banks and brownish water flow slowly under a canopy of second-growth hardwood and pine.

To understand Swift Creek's significance, you need a proper introduction—off the road, down in the water, with your hands wet and your feet in the sand. For that, I turned to John Alderman, the Wildlife Commission's nongame biologist for the Piedmont. John has studied the wildlife of Swift Creek and other Piedmont streams for six years, particularly their rare freshwater mollusks. He cares deeply about the unsung—and often vanishing wildlife—of these threatened habitats and has been tenacious in his efforts to protect them. It's a quality that's won him friends in some circles, earned him enemies in others.

It is a glorious day in May when John, fellow nongame biologist Chris McGrath, and I slide two canoes down an embankment to a put-in site on the creek. The sun is out, the air is cool and birds are singing. Despite heavy rains during the night, the stream today is clear, amazingly clear for a Piedmont stream, the color perhaps of diluted ice tea.

The first thing I note as we enter the stream is what is missing: trash. The second thing that grabs my attention are the rocks ahead, a chute of fast water and a set of mini falls. *Uh-oh.* Before I can think "what-am-I-doing-here," we're in it. It's hardly white water, but it's just frothy enough where the stream pinches down and zigzags left to right to make my eyes bulge in pure greenhorn glee. I do not turn the canoe over, though I do my flailing worst to try. An apt name, this Swift Creek.

One hundred yards downstream, we must portage the canoes over a fallen log. A foot-long catfish darts out from the blowdown as we heave the canoes atop and across. Sunfish dart and flit in the shadows. I retrieve a varnished wooden bobber from a stick up alongside. A useful trophy for me and a reminder of the creek's excellent gamefish populations. Surveys have shown that Swift Creek and its tributaries are some of the best recreational fisheries in the Tar River watershed, no doubt because of its unpolluted waters. The stream has one of the state's only genetically pure stock of Roanoke bass and in spring hosts runs of American shad. I'd like to do some stream sampling myself—with a fishing rod I'd soon have supper.

But John and Chris are after dinner scraps of a different sort today—muskrat middens, to be exact. These are mounds of shells left where muskrats have feasted on native mussels and *Corbicula fluminea*, the tiny Asiatic clams that are becoming more and more common in freshwater streams across the state.

"The middens tell us several things," Chis explains as we paddle downstream. "By examining the shells we can tell what mollusks are found in a particular stretch of the river. By the size and age of the shells we can also see if reproduction is occurring."

"There's one," Chris says, back paddling the canoe to the bank. I scan in vain for the

midden and do not see it until Chris points it out. He sifts through a pile of roundish quarter-sized mollusk shells at water's edge. "All *Corbicula*."

John and Chris quickly note a couple of problems. Spring has been cool this year, making the muskrats unusually inactive. They have eaten less and, consequently, left fewer fresh middens to help Chris and John evaluate native mollusk populations. More vexing, however, are the muskrats' apparent increasing fondness for *Corbicula*, a non-native species. Populations of these exotic clams have mushroomed in recent years, perhaps due to large-scale timbering in the watershed. The broken forest canopy has opened the stream to sunlight in stretches, allowing water to warm. The muskrats have keyed in on the prevalent *Corbicula*, and now they seem to overlook the native mussels as a food source.

"What this means is that we'll have to work harder to document what's happening with the mussels," John says, "and we'll probably need to do more scuba diving to search for live native specimens." But the cool weather and missing middens, the biologists say, are only minor issues. Both biologists are more concerned about potential long-term threats to the stream, of which there may be many.

The stretch we are floating today still has some of the stream's best populations of native mussels. "What has saved this creek and its wildlife so far is the lack of large municipal reservoirs upstream or major contributors of point-source pollution," says John. "Point-source pollution from large waste-water treatment plants and reservoirs are generally the kiss of death for native mussels and aquatic diversity in a stream."

These are two threats that biologists fear. The presence of federally listed endangered species, as well as numerous state and federal candidate species, should preclude construction of either a reservoir or a major sewage-treatment plant on Swift Creek, at least for the foreseeable future.

For the most part, we float the creek under a half tunnel of sweet gum and swamp oaks, black oaks and beech. The overhanging branches and leaves keep the water clear and cool. Here and there, though, the forest canopy opens as we pass clearcuts of recent vintage. Glaring shafts of sunlight dance on the stream and warm our backs as we pass.

Virtually all of the forests in the Swift Creek subbasin have been logged at one time or another since European settlement. Swift Creek flows entirely through private land, and in recent years landowners have taken profits by cutting as timber prices have soared. John is quick to point out that logging itself is not a problem, only the manner in which it is sometimes done. Some sections of Swift Creek have silted in where landowners have cut trees all the way to the stream bank or left only trees on the bank, which topple easily in strong winds.

In other areas, sufficient buffers have been maintained to protect the creek. "Timber harvesting doesn't have to harm this stream," John says. "Nature is resilient. If people would leave buffers of 100 to 150 feet, then come back and selectively harvest those buffers, there would be no problem." Here and there we pass areas of recent cutting where the canopy has already begun to heal. "The silt situation already looks better than last year," he adds.

As we stop at middens along the float, John and Chris begin picking up native mussel shells—a squawfoot here, a triangle floater there, a mound of Eastern elliptios at this one. They place the shells in mesh bags and, at night, will measure each, determine its age, then catalog it.

Still, the majority of shells they examine are *Corbicula*. John observed an increase in *Corbicula* once the canopy was opened and silt levels increased in the stream. The growing populations of this exotic clam are of concern to biologists. In other streams where *Corbicula* are increasing, native mussels are declining. Whether the pollution-tolerant exotics are outcompeting native mussels for stream habitat, or simply moving into niches vacated by already declining natives, is not fully understood.

What biologists truly fear is the zebra mussel, a sort of Attila the Hun of noxious exotic mollusks. The zebra mussel is spreading fast from the Great Lakes down the Mississippi, wreaking biological havoc as it goes, and it is expected to penetrate riverine ecosystems in the Southeast soon. This exotic from the Caspian Sea reproduces quickly, clings to virtually everything and tolerates a wide variety of environments. Because zebras colonize quickly and outcompete native mollusks for food and space, the potential for ecological disaster is great.

The U.S. Fish and Wildlife Service predicts at least 20 freshwater mussel species may become extinct, including 13 in North Carolina, if the zebra mussel establishes itself in reservoirs and larger rivers. The outcome could be worse if it successfully invades small creeks like Swift Creek. "One positive thing—zebra mussel may not do well in small well-protected creeks."

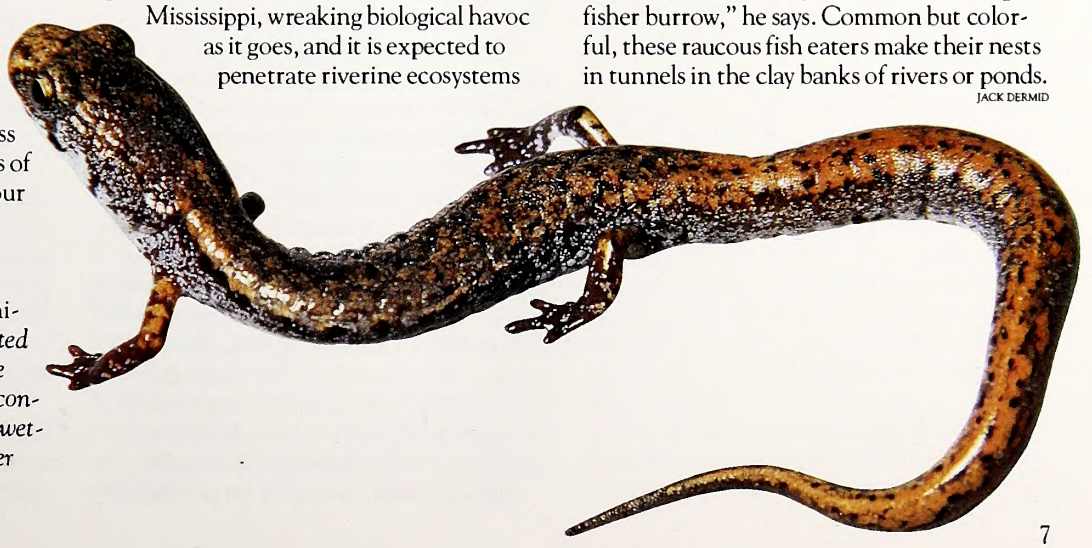
At midday, we stop for lunch on an exposed sand bank. Three large longnose gars drift down the current in front of us, each fish slowly circling the other. Languorous, almost lazy strokes belie armor-like scales and long snouts of pitiless teeth. With their constant circling, they don't appear to trust their backsides to each other. But then they swing into ambush position, three abreast in descending order of size, and hold face-forward into the current behind a log that juts into the flow.

These ancient survivors from Eocene epoch pay us no mind. They have been on this world 40 million years, after all, and may hang around another 100 million or so, long after humanity has crowded itself out of existence.

With paddles out of hand and eyes off the river, our ears open and the trees come alive. There are birds in the branches above, hundreds of them, blossoming in the songs and sky dances of May courtship ritual. A recent spring census by Stephen Hall, a biologist with the N.C. Natural Heritage Program, recorded 62 species along the creek in early May, including 13 species of neotropical migrants and others dependent on mature bottomland hardwood forests.

John points to a perfectly circular hole in a small bluff on the opposite bank. I am puzzled—too large for a snake, too small for a muskrat or otter, and definitely not a beaver. "Kingfisher burrow," he says. Common but colorful, these raucous fish eaters make their nests in tunnels in the clay banks of rivers or ponds.

JACK DERMID



The four-toed salamander (Hemidactylium scutatum) *is a state-listed terrestrial amphibian found in the Swift Creek subbasin. Its habitat consists of riparian areas and forested wetlands. Adults are often found under logs and other objects in moist soil.*

MELISSA McGAW

In addition to having *the world's best population of the Tar spiny mussel, Swift Creek is also home to the state's best populations of three candidate species for the federal endangered species list: the yellow lampmussel* (Lampsilis cariosa) *left, the Atlantic pigtoe* (Fusconaia masoni) *right, and the yellow lance* (Elliptio lanceolata) *not shown.*

Kingfishers have been known to fly like kamikazes into a streambank in order to dislodge dirt with their long pointed bills. But they survive to fly away to tilt with the earth again.

Chris, meanwhile, is on the trail of the yellow lance mussel. These mussels leave a long meandering furrow on the sand bottom as they migrate along, not unlike a child's doodle on a finger painting. Chris follows the trail until it ends. He looks for two "eyes"—siphons actually—to betray its position. *There*. He pulls up the two-inch long yellowish mussel—a gravid female, so ripe with eggs that she cannot close her shell. We find dozens of yellow lance on this sand bar, many of which are gravid females. It's a good sign for this mussel, one of the creek's three candidate species for federal listing as an endangered species. They are abundant, in this creek at least, and are breeding freely.

"That's prime Tar River spiny mussel habitat," says John, pointing to an eddy behind a log. Swift Creek is now a refuge for the world's only viable reproducing population of spiny mussel. The water that John points to is 4- to 6-feet deep and swirls slowly over a firm gravel bottom. Nearby areas are also prime habitat for *Necturus lewisi*, the Neuse River waterdog, one of Swift Creek's state-listed amphibian species. The Neuse River waterdog is found only in North Carolina, specifically in the streams and tributaries of the Neuse and Tar rivers. Sadly, *Necturus* is declining in much of its range, in large part because of reservoir construction and declining water quality.

Alvin Braswell, curator of herpetology for the N.C. Museum of Natural Sciences, considers Swift Creek to have one of the state's best populations of the Neuse River waterdog. His survey of the area also found 52 species of reptiles and amphibians in the subbasin, although he estimates over 80 species probably exist. The Swift Creek subbasin is also home to the four-toed salamander (*Hemidactylium scutatum*), a terrestrial salamander on the state's list of threatened species.

After lunch, we push downstream for a mile or so, halting and clambering from the canoes at a sandbar astride the stream channel. With fingers spread like tines, we rake the bar with our hands, pulling Eastern elliptios and *Corbicula* from the coarse sand bottom.

Chris plucks a large Carolina slabshell shell from the bottom. There is a hole in one shell and inside something is writhing. "Carolina madtom," Chris says, opening the bivalve to reveal a small catfish-like minnow. It flutters like a tiny billowing sail in his hand, then falls to the water. "They use the empty mussel shells for shelter," Chris explains, "or soft drink bottles." The latter is not missed, John adds.

Swift Creek has one of the state's best populations of Carolina madtoms, but, like the waterdog, it is declining elsewhere in the state. The Neuse River's Carolina madtom populations, for example, are considered of special concern. "As other populations of madtoms decline around the state, Swift Creek's population will increase in importance," says John. "It's possible this species may require federal protection via the Endangered Species Act at some time early in the next century."

"Can you see what this stream means now?" John asks. "This is *it* for so many species." Biologists like Alderman see small streams like Swift Creek as biological refuges, last bastions of aquatic biological diversity.

If native mussels and some other threatened aquatic species are to be saved from extinction, it will be because small unpolluted headwater streams are protected. "You can almost write off mussels in many major rivers" John explains. "They are now too developed and too polluted."

Events bear out these observations. In the last century, about half of the nation's freshwater mussels have become extinct, endangered or decimated to the point where federal protection is being considered. In North Carolina alone, half of the state's 60-some species are now listed as endangered, threatened or of special concern.

There are also arguments for saving places like Swift Creek for people. "As the Piedmont develops in the next 50 years," John says, "streams like this will be the greenways

JACK DERMID

***Swift Creek is home to** one of the world's best populations of the Neuse River waterdog* (Necturus lewisi), *a state-listed amphibian species found only in North Carolina. Although populations are healthy in the creek, they are declining in other streams because of water-quality problems.*

of the future, places where people can come to fish, canoe, hike or just relax."

After raking another bar for mussels, we sweep round a sharp bend to the right. The sound of rumbling trucks and squawking cars sifts through the branches to greet us—it's the bridge crossing for Interstate 95, one of 22 road crossings strung across Swift Creek's 86-mile length.

Highways, road crossings and the biological health of watersheds often mix about as well as oil and water. Building bridges and widening highways always have the potential for increasing silt load into a stream. The larger the volume of traffic, the greater chance for spills or accidents involving hazardous waste or pollutants, and contaminated runoff can impact some watersheds. Preliminary tests on Swift Creek show impact to be minimal—at least to date. "The good news is that the N.C. Department of Transportation has been working closely with us on protecting federally endangered aquatic species," says John. "That's helped here."

Just down from the overpass we pass a drain pipe poking from the mud bank. Its source is a motel, where treated effluent is pumped into the stream. It is one of only eight permitted point-source discharges into Swift Creek and its tributaries. The other point sources include three schools, one industry and three rock quarries. Because there are so few point-source discharges, their impact is thought to be minimal.

Around the corner lies the take-out site. I've floated less than a tenth of Swift Creek's length and seen but a few of its biological treasures. The road and effluent pipe are telling reminders that Swift Creek is not pristine, but it's still clean enough to be the best home that's left in the world for several species.

As we prepare to haul the canoes ashore, John tells a story. "Farther down in Edgecombe County, you can find ancient whale bones and huge shark teeth in the creek, lying in little hollows in the sand," he says. "I've found teeth that are 2 inches long dating from the Yorktown (geologic) formation, about 4 million years old, when the Coastal Plain was a sea. Now, that's old.

"But mussels, like the ones in this creek, predate all that. They evolved 300 million years ago. Now that's *really* old. And they're still here!"

There is a parable in John's words. We are to the earth of today what giant sharks were to the oceans of the Pliocene. Dominion is ours. The difference being that, unlike sharks, we can make a choice of what we eat or what we spare, what we consume or what we conserve. Until recent years, we haven't had to make that choice with our Piedmont creeks; our plate has remained mostly full. In the future, given growth rates and human needs, Swift Creek and its unique life will present us that choice again when we divvy up what's left of the Piedmont's natural resource pie.

Lets hope we make the right decision at that time, because there's 300 million years of life riding on the outcome. ☒

Fat Alberts & Flies

The little tuna's torrid runs can smoke a reel, giving new meaning to "tuna melt." Imagine catching this speedball on a fly!

written and photographed by Tom Earnhardt © 1993

***Tom Earnhardt admires** a little tuna or spotted bonito he caught on a fly. Because these fish often chase bait near the surface inshore, they can be caught on light tackle. Flies like the Clouser Minnow (above) closely imitate the small glass minnows or other baitfish that little tuna feed upon.*

My skiff was in less than 3 feet of very clear water as I watched a fast-moving school of 10- to 15-pound fish pushing water as it moved closer to the boat. Ahead of the school, panicky bait fish were leaping out of the water in all directions in an effort to escape the predators beneath them. I made a cast just ahead of the lead fish and within a split second was fast into a fish that clearly wanted to take all my line home with him. In a little more than 30 seconds, 250 of the 300 yards of line on my reel had melted away. I hollered to Buzz Bryson, my fishing partner, to crank the motor and give chase. By the time we matched the fleeing fish's speed only a few turns of a line remained before the knot at the bottom of the spool.

Fifteen minutes later I had a 14-pound green and silver torpedo by the boat. With a quick jerk of the hook the fish was free, and we watched as it slowly swam away. You may be wondering on what tropical flat or in what remote location this action occurred? The nearest skyline was not the palm trees of Key West, but the cargo cranes of Morehead City.

If you think you have to go to the Florida Keys, Central America or Christmas Island to catch fish capable of making 200-yard runs, then you are missing out on North Carolina's best-kept light-tackle secret. I'm not talking about channel bass, bluefish or king mackerel. False albacore (*Euthynnus allettertus*), also known as spotted bonito, little tunny, "Fat Alberts," or simply "Alberts" are probably the most underrated light-tackle game-fish in North Carolina's inshore waters. They are quite common and can be found in the spring and fall along our coast from Cape Fear to the Virginia border. During mild winters they may even be present in inshore waters into December and January.

Like so many other fish caught in our coastal waters, false albacore are most often caught on heavy trolling tackle or on stiff surf rods by anglers seeking other species. On such tackle they are simply over-matched. However, when caught on fly tackle or light to medium spinning tackle, these 8- to 18-pound speedsters can be spectacular adversaries. They can zoom away at speeds one third again as fast as a bonefish. There is an added bonus with false albacore: like tarpon and bonefish, they aren't good to eat, making them ideal candidates for catch-and-release. Also, their numbers remain high while stocks of more tasty species have declined due to commercial and sport-fishing pressure.

Perhaps the best thing about false albacore is that they can be caught by anglers in small boats close to shore, and by anglers in the surf. The largest concentrations are often near inlets that serve as natural funnels for baitfish. It is not unusual to see these fish in shin-deep water streaking after forage fish. Alberts are available in the spring during their northern migration, but late September through November offers the best chance to catch them during inshore feeding frenzies marked by showering bait and screaming gulls. Their green and silver football-shaped bodies with irregular dark lines behind the dorsal can be seen arching through the air over schools of menhaden, finger mullet, or silversides (also called glass minnows).

I have caught albacore on spinning tackle, and light plug rods, but by far my favorite way to catch them is with a fly rod. Because these fish are very fast, and pound-for-pound much stronger than most other inshore species, some special tackle is required, especially if you are using flies.

This point was vividly illustrated to Buzz Bryson and me during a recent November outing. Together, Buzz and I hooked over 20 little tunny between 8 o'clock that morning and 2 o'clock that afternoon, and in the

***Buzz Bryson battles** a little tuna on a flyrod, but you can bet his fish ran off at least 150 to 200 yards of line before Buzz was able to get a good look at it. Averaging 7 to 10 pounds, with occasional fish to about 20 pounds, the little tuna is a handful on light tackle.*

process, we saw two of my very good lightweight bonefish reels totally destroyed. The two lightweight fly reels, whose manufacturer's names shall remain anonymous, had accounted for a number of bonefish and Atlantic salmon before that fateful day. The high-speed runs of several false albacore simply overheated the drag of one reel, causing it to seize and stop. I guess you could call it "tunny melt." The drag of the other reel did fine, but the side plates of the reel spool could not stand the constant pressure of 250 yards of backing being packed back on the reel after a long run. After probably the fourth fish on that reel the side plates simply expanded, and looked like a donut.

So what kind of tackle is adequate? The single most important investment you can make for false albacore fishing is in a quality fly or spinning reel with a smooth drag. As just mentioned, the lightweight (thin metal spools or graphite spools) saltwater fly reels are simply not adequate for albacore. Whatever reel you choose, and there are many on the market, make sure you choose one with enough capacity to hold your fly line and at least 250 yards of backing, or have a fast boat! You may not need 250 yards for little tunny hooked in deep water, but if you hook one in an inlet, on a shallow flat, or while fishing from the beach, they have the speed and strength to swim as far as necessary to reach the safety of deep water. Go for the heavier reels, especially those with machined aluminum spools. Anglers new to saltwater fly rodding may need an anti-reverse reel so that the handle doesn't move while the albacore is running. I prefer the knuckle busters—direct drive fly reels that give you more contact with the fish—when the fish runs, the reel handle turns. Fly reels made by Abel, Fin-Nor, and Billy Pate are beautiful and fantastic to fish with, but they also cost a small fortune. Some of the new reels made by Scientific Anglers, Lamson, Orvis, Cortland, and Martin are more than adequate and can be acquired in price ranges from $100 to $250. Needless to say, I haven't included the brands that failed.

Similar rules should guide your selection of a spinning reel. A reel that you would use for speckled trout with 150 to 200 yards of line is simply not adequate. Almost all of the heavy freshwater or light saltwater reels capable of holding 300 yards of 10- to 12-pound test made by Penn, Daiwa, Shimano and others will meet your needs. I suggest, however, that you get a reel in the upper end of the spinning reel price range since they usually have better drags and stronger spools. I've often told friends that little tunny are one of the few fish under 20 pounds for which you have to use a tarpon-quality reel.

Choosing a rod is much simpler than choosing a reel. If I had to choose one fly rod for false albacore it would be 9 feet long, made of graphite, and matched for a 10-weight line. A 9-weight rod will work, provided it has a fairly stiff butt section for more "pulling power." Since I release most false albacore I catch, I like to fight them with rods with sufficient backbone to land them quickly. A "wimpy" rod will allow a fish to fight too long, causing it to die from exhaustion. Members of the mackerel and tuna families are hard to revive if played too long and will simply sink and die. Again, my first choice is a 10-weight rod.

As with fly reels, you can spend as much or as little as you want on a saltwater fly rod. Premium graphite rods now run over $400 from most major manufacturers, but some excellent rods are still available in the $100 to $200 range. Often the major differences between the high-end rods and their lower-priced cousins are in the quality of the reel seats and in the cosmetic wrappings. I personally prefer to buy saltwater fly rod blanks for less than $100, then build my own custom Albert rods (all for less than $150).

If you are going to be using a spinning rod, I would suggest a fairly stiff rod (6- to 7-foot range). Typical speckled trout rods used for Spanish mackerel do not have enough backbone to fight little tunny properly.

The choice of lines and leaders is also not very difficult. As mentioned earlier, I am a fly rod addict when it comes to Alberts, and although I have used floating, intermediate and sink-tip fly lines, 90 percent of all my false

albacore have been caught on a floating fly line. A weight-forward, floating 10-weight line is fine for fishing from a boat and the surf. With the floating line you can throw poppers and streamers of all sizes. There are of course times when specialty lines such as sink tips or sinking shooting heads are desirable. For example, a sinking line may be the ticket when probing likely areas when albacore aren't showing, such as along jetties or in a deep narrow channel. However, for almost all the Albert fishing I have done, a floating line has been more than adequate.

Because many saltwater critters have sharp teeth or rough mouths, special leaders with wire or heavy shock tippets are needed, but not for little tunny. My albacore leaders are the most simple you can imagine. In ordinary water conditions (average clarity and light chop), I use a standard tapered leader with its tippet testing 12 pounds. When the water is very clear and very slick, I blood-knot an extra 5 or 6 feet of 10- to 12-pound test onto the 9-foot tapered leader. With about 14 or 15 feet of leader I am much less likely to spook fish with the fly line. I also use the longer leaders when I use weighted flies with the floating line. The longer tippet makes it easier for heavy flies to sink quickly.

There are occasions during both the spring and fall migration of fish when schools of false albacore will be in close proximity to schools of feeding bluefish, Spanish mackerel (*Scomberomorus maculatus*) or Atlantic bonito (*Sarda sarda*). On a number of occasions when I thought I was casting to Alberts, my leader has been snipped off neatly by a Spanish mackerel or a large bluefish. When there is a mixed bag of predators feeding on bait fish, it is often wise to use a short piece of wire at the end of your 12-pound tippet. As long as the water isn't too clear, wire will not usually spook a false albacore, but it will also enable you to catch their toothy brethren.

You may be wondering why I'm so insistent on leaders of 12-pound test (or at the very least, a leader testing 10-pound test). I have already indicated that false albacore are very strong fish. I believe that the use of a 12-pound test leader is the most sporting way to catch them, since a 12-pound tippet will enable you to apply enough pressure to fight the fish hard enough to bring it to your boat alive, thus enabling you to release it unharmed. I have found that the use of light tippets, 6- to 8-pound test, allow the fish to fight far longer than necessary, and it becomes exhausted and will often die despite efforts to revive it. Even with a 12-pound test leader and a 10-weight rod, however, you may still kill a few fish, but not nearly as many as you would using much lighter tippets. Also, it's best to try to release fish as soon as possible.

Although I have caught false albacore while float fishing for kings using small bluefish and menhaden, I've found that smaller flies and lures will more often match the small bait fish on which they normally feed. Anglers should carefully observe the size and shape of baitfish they use when albacore are feeding. During the fall, especially, little tunny will cut repeatedly through tight pods of silversides causing them to shower in all directions. A small, sparsely tied Lefty's Deceiver, Clouser Minnow or epoxy-head minnow ("Surf Candies") with painted eyes, a pale green back, silver sides, and white belly, is almost irresistible to feeding albacore. When the water is very dirty or stained, black or chartreuse flies are more easily seen by fish and will draw more strikes. Most of my best patterns are 1 1/2- to 3-inches long, and tied on hook sizes 4, 2, and 1/0.

Similarly, I have found that very thin jigging lures such as Stingsildas or small, thin Hopkins lures are far more likely to attract the attention of an Albert than the large Crocodile spoons or large Hopkins lures often used for bluefish. Whether using a fly or a thin jigging lure, the trick is to get it just ahead of fast-moving albacore and moving the fly or lure almost as quickly as it hits the water to attract attention. Sometimes a rapid steady retrieve is most effective, while at other times short jerks and a more erratic retrieve works best.

Whether you fish with flies or lures, sharpen your hooks and bend down the barb. It is actually easier to hook a fish with the barb filed off or bent down with pliers, and most experts agree that you won't lose fish for lack of a barb. Smaller barbs also make the release much easier.

I have found that just as important as having good tackle and the right flies and lures is knowing what tactics to employ while fishing for false albacore. The most common mistake many anglers make when fishing from boats is to charge into a school of Alberts at full throttle. That puts down everything within 100 yards. As with any other type of fishing you must be patient and watch the motion of birds that are hovering over schools of baitfish waiting for albacore to push them to the surface. It is far better to run completely around feeding fish once you have established the general direction in which they are traveling and let the bait fish and the feeding albacore come to you. When fish are working within casting distance, it is usually preferable to cast to the edge of a pod of baitfish rather than casting into the middle of the baitfish.

Without a doubt, false albacore provide the most sport when they are right in on the beach or on sandy shoals near points and inlets. In such places I like to wade while watching for hovering birds and showering baitfish. It is not uncommon for Alberts to smash schools of baitfish in only a foot or two of water. I have often stood for extended periods where there was a cut or a slough between two sandbars and waited for little tunny as they came through the same spot again and again looking for baitfish. I have also had good results "blind casting" at such locations. Unseen fish will often move into areas where bait is concentrated. This kind of "stakeout" fishing is especially effective in the early morning during the fall migration.

If you plan to fly fish in the surf, a shooting basket is necessary to keep your fly line from being tangled by rolling surf. They are available commercially, or you can make one from a plastic wash pan with holes in the bottom secured around your waist with an old belt. Fly fishing in the surf can be exciting, but it can also be hazardous for other fishermen nearby. Remember, your backcast can easily snag a rod or another fisherman.

If you are going to use a fly rod in a boat you will have to do some "foul proofing." Fly lines always follow Murphy's Law—whatever can be snagged, wrapped or looped in a boat will be. Clear mooring lines and anchor ropes away from areas where line will be stripped onto the deck. Cover cleats and hinges with a wet towel or strip of duct tape. Above all, simply watch where your line falls when you strip it into your boat. More fish are broken off right after the strike than at any other time because anglers fail to get the fly line cleanly off the deck.

Over the past two decades I have enjoyed occasional trips to the tropics for bonefish and tarpon. Catching either of these fish is a thrill. On the North Carolina coast I have regularly taken Spanish mackerel, speckled trout, puppy drum and bluefish on flies. I have also tangled with cobia and king mackerel with a fly rod. However, for all the reasons given above, I rate the false albacore as the inshore light-tackle angler's best all around challenge. They are noisy feeders and show themselves on the surface. They take well-presented flies and lures, and they have the speed and strength to match or exceed any similar-sized fish in the ocean.

Whether you're fishing near Cape Fear, Cape Lookout or Cape Hatteras during the spring or fall, you are missing out if you don't take time to learn more about these spectacular gamefish. Just don't forget to take another reel in case your first one succumbs to "tunny melt." ☐

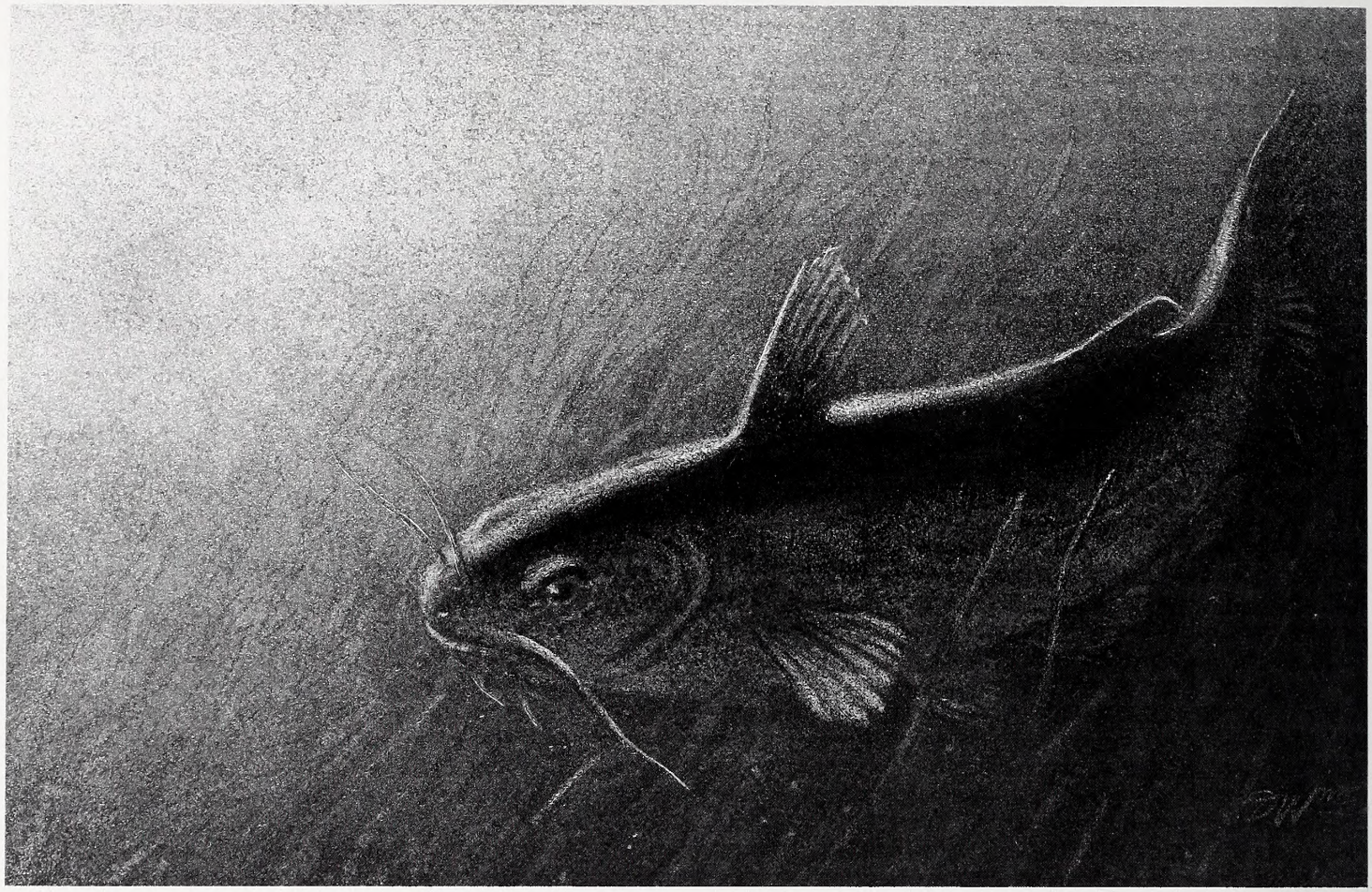
Cats on the Line

Fishing a trotline is a timeless art that can unlock the secrets of a river.

written by Mark Joyner © 1993
illustrated by David Williams © 1993

All fishermen could be divided into just two groups—those who have fished a trotline and those who haven't. Of course some caution is necessary here, since many of those who claim to have used a trotline haven't actually set a line themselves but knew someone who did. Even such secondhand knowledge is sketchy, as all they can recall is a deep hole a mile or two below the dam that always produced sacks full of catfish. It is exactly this lack of reliable river lore that makes this old fishing device worth looking into again.

Actually I never thought much about trotlines one way or the other until I took a canoe trip down the Pee Dee River some years ago. For the third or fourth year in a row, two friends and I had gathered to spend a few days camping and fishing. The summer before we had stumbled onto hungry channel cats that couldn't seem to get enough of the crickets we were dangling beneath corks. In the early morning, then again at dusk, our light tackle was put to the test time after time with 2-foot cats.



Yet, one event on that trip was to alter our ideas about catfishing forever. One day we watched a fellow near us struggle for 30 minutes with something big on the bottom. With patience and calmness he finally dragged over the side of his boat the largest catfish I'd ever seen—it was about 3 feet long. A fish that size would probably have overturned our canoe or at least towed us downriver, but still we were fascinated by the size and strange color of this huge fish.

Luckily, at the end of that day, the angler, Clegg Thomas of Ansonville, eased his boat over to our campsite, giving us our first good look at a flathead catfish with its broad, flattened snout and cavernous mouth. Its tiny, beady eyes were almost hard to find on that great whiskered head. Two other flatheads were lying in the boat, both weighing over 20 pounds and having the same mottled yellow and brown color.

All three of these were just youngsters, we found out, with the big one we had admired weighing in at 34 pounds. The primitive-looking flathead grows right on up to 80 to 90 pounds, thriving on a diet of any fish smaller than itself. Apparently, I had been asleep a few years back when they were introduced to some Carolina rivers, including the Pee Dee-Yadkin chain and the Cape Fear.

Along with it had come the even larger blue catfish, both brought here from the big river systems of Mississippi and Missouri. Older reports of 200-pound blue cats are on record and such 5-foot monsters remain the stuff of freshwater legend. A 117-pound blue cat taken on a trotline in Missouri still holds the modern-day record for any catfish species.

In North Carolina, the flathead and blue catfish were already beginning to live up to their reputations as top dogs in the catfish family. Both seek deep holes in old river beds, with the blue showing a little more willingness to accept cut bait—as long as it's fresh. The flathead, however, wants its food live and kicking, and it is usually taken on live bream or other bait fished just off the river bottom.

All that winter I thought about those big flatheads, how their enormous size and strength dwarfed the bullheads and channel cats I had grown up catching in creeks and farm ponds. I took great delight in thinking of how I would go about catching these monsters, now that I knew they existed. We would all need heavier gear, of course. I fashioned my flathead outfit from a stout 6-foot wooden rod and Penn reel my dad used at the beach.

Now here we were with the river running high for three days in a row, meaning that the turbines miles upstream were wide open. This stretch of river was subject to sudden 4- to 5-foot changes in water level, as we had learned the previous summer after finding our canoe hanging up in a tree on our first morning. The fish here seemed to have adapted their feeding patterns to these wild fluctuations, responding voraciously to sudden rises in water level after low periods.

We caught only a few fish, enough to make it worth heating up my friend Jinks' homemade frying pan, but we saw nothing of the big cats we had hoped for. As we sat by the fireside on our last night, it occurred to me that there was one thing we hadn't tried, and that was the brand new trotline in my pack.

I had purchased a special-device fishing permit that spring so my dad and I could wade around in thigh-deep water gigging sucker and carp by lantern light. (It was a successful trip, as neither of us was stabbed.) Under the mistaken impression that using trotlines was one of those peculiar fishing methods allowed only by permit, and wanting to get my money's worth of fishing, I had added a trotline to my pack then forgotten about it.

It is the mark of a good camper to show interest in things a buddy pulls out of his pack late at night around a fire, and these guys were the best. We were unrolling the trotline there by the river before I read the instructions. That's when I realized there were no instructions.

Well, maybe the package said something

simple, like: "Look carefully at this length of line, this bulging bundle of bristling hooks, each to be attached to a shorter line and then affixed to barrel swivels on the main line, all wrapped as tight as Dick's hatband around a small piece of Styrofoam. Look quickly, as you will never, ever see it this way again."

Never mind that now, we had fish to catch. Rather than have a tangled and dangerous mess at our feet, or try to assemble it out on the dark rushing water, we strung the line from tree to tree, snaking it through our campsite and into the woods in both directions. We attached the hooks and converted part of the day's catch into cut-bait, and soon chunks of meat were dangling all around us at eye level. At least no one would be sneaking up on us from the darkness with this grisly perimeter defense.

Now that we had the whole apparatus ready to go, we decided that we could probably transport it this way back up the river to a spot we had picked out, keeping it tightly stretched between our two canoes to avoid snags. My friend Carlton and I took the lead line in his canoe, with Jinks bringing up the downstream end to which he would attach his anchor.

Now you're probably thinking you would have rolled that line up first, maybe twirled the whole mess up on a forked stick to keep all those hooks and pieces of fish from flying around in the dark. Well, you weren't there, and while it seems as though I must have suggested that myself, now that I think about it, I let these boys do it their way, even if it was my trotline.

We had no trouble dragging Jinks upstream against the current, although he says he was paddling. We had deliberated—as fishermen will—as to the best set of the line, whether to stretch it just under the surface, sink it to the bottom, or suspend it at some depth. We settled on a little of each by tying the upstream end to a log at the surface and then sinking the downstream end to the bottom in 25 feet of water.

We left the trotline to work overnight and paddled back out at first light. We were as anxious to see how we'd done as boys running out early in the morning to check their rabbit traps. Drawing near, we could see the line lunging and jerking. Hand over hand we pulled the line in, met every few feet by an explosion of water as we took off a dozen or so nice channel cats as well as two blue cats, both of which weighed in at 4 to 6 pounds.

Still there was something powerful pulling on the line, and finally from near the bottom came our prize—a thrashing 14-pound flathead that just this one night decided to forego its preference for live food and inhale a piece of, what else, catfish. We released the fish we didn't intend to eat, but we made sure this flathead was headed for the frying pan where it could be better appreciated.

And then it was time to take up the trotline. Of course we had trampled the piece of Styrofoam, but it seemed to me I could just as easily coil the works up into the bottom of a 5-gallon bucket. A clockwise twist, with hooks neatly to the inside, and then a piece of cardboard stuffed down tightly on top of it all would hold everything in place until called for again. I could still use the bucket to stow the rest of my gear.

Within a few weeks I had a chance to try the trotline again, this time on a lake near Raleigh. I convinced my friend Neal to sit in the bow of the canoe since all he had to do was watch the line pay out while I backed us away from the tie-off point. In no time at all my neat ropework looked like it had been stirred with a stick. Each hook seemed to have mated with others farther down the line.

As for the morning's catch, it was disappointing—no fish, and all the bait was gone, which this time included crawfish I had caught myself. Worse, two small turtles were on the line that apparently drowned even though the line was right at the surface. We put the line back in the bucket, cardboard and all, like a hazardous jack-in-the-box.

Before long I had another occasion to try out the trotline. My son Josh and I went camping along a deep stretch of the Cape Fear that was known to produce hefty blue cats. This time there were a few modifications of the process. I had turned a short plank of red cedar into a permanent line holder by cutting a groove along one end that would safely hold the hook points. With the line wrapped tightly around the board, everything was kept in place. The board also floated, and it made a fine surface around camp for setting a drink down or cleaning fish.

I also had added a brass snaphook on the upstream end of the line to allow quick hook-ups and releases. Tugging and strain on this end tend to make any knot hard to untie, and a fisherman who doesn't appreciate the double virtues of a bowline (it won't slip and it can usually be undone) will likely have to cut his line loose by morning.

After putting out our line with cut-bait, we added our newest secret weapon. Josh had made three chum containers from short lengths of PVC pipe that he had drilled full of holes. Before hanging these on the trotline, we filled them with a special blend of chicken livers, freshly picked catalpa worms, a handful of freshwater clams we had gathered and crushed with a rock, and a few scoops of commercial catfish food. It was probably best, after all, to keep this kind of madness inside the family.

The next morning we had only one dusky-looking channel cat on the line, a fine 11-pounder, but it was all worth it. I drank coffee by a smoldering fire and watched a suddenly grown son handling the canoe all by himself. There would be other fish to catch on other rivers, but none would outweigh the memories of times like these.

From such fishing trips over the years I've now developed what I think is the proper use and enjoyment of a trotline, and it's amazingly simple. Never fish a trotline thinking you'll just come back the next morning for your fish. To gain a proper respect and appreciation for the river alone, you must float downstream most of the day, unhurriedly flipping spinner baits on an ultralight casting rod around cover. The occasional tussle with a fat bluegill or largemouth passes the time until a dry sandbar appears ahead of you on the inside bend of the river.

It's a perfect spot to stretch your legs and pitch a tent. There's firewood to be gathered and dinner to start, but before the sunlight fades, place the trotline. Along the deeper outside bend of the river would be a good spot, as would a site just below the mouth of the nearby creek feeding into the river. This is the time of day when the river is in transition between light and dark, day and night.

If you've ever fished a river at night, you know the mystery that steals over the dark water as the moon rises. A primitive side of life reveals itself here, as bowfin, gar and wicked-looking eels replace the sunfish and bass of the daytime. Huge snapping turtles appear from out of nowhere to eat the fish off your stringer, leaving only the heads. From somewhere deep, ancient catfish stir themselves, shake their great whiskered heads, and begin to home in on an unusually heavy scent trail that leads straight to your line.

This is the realm of the trotline, the kingdom of species many fishermen often think of as trash fish. Perhaps it's just me, but I find it exciting to flip a thrashing 4-foot gar at my partner's feet in the bottom of a suddenly-darkened canoe. Lugging an 8-pound bowfin into a canoe, I can appreciate the brute strength of such an animal even while trying to avoid its dagger-like teeth. Both released unharmed, both appreciated for the fascinating predators they are.

The trotline recreates a timeless fishing method no doubt practiced in some form by Native Americans along the same river banks we now fish. Yet at the same time, the trotline represents something of a lost art. For the curious, it remains largely a skill to be claimed from scratch, a task worth undertaking if for no other reason than the cross section of secretive river life it reveals. At the very least, it promises to add new excitement to a night on the water. ☒

Is the Endangered Species Act Endangered?

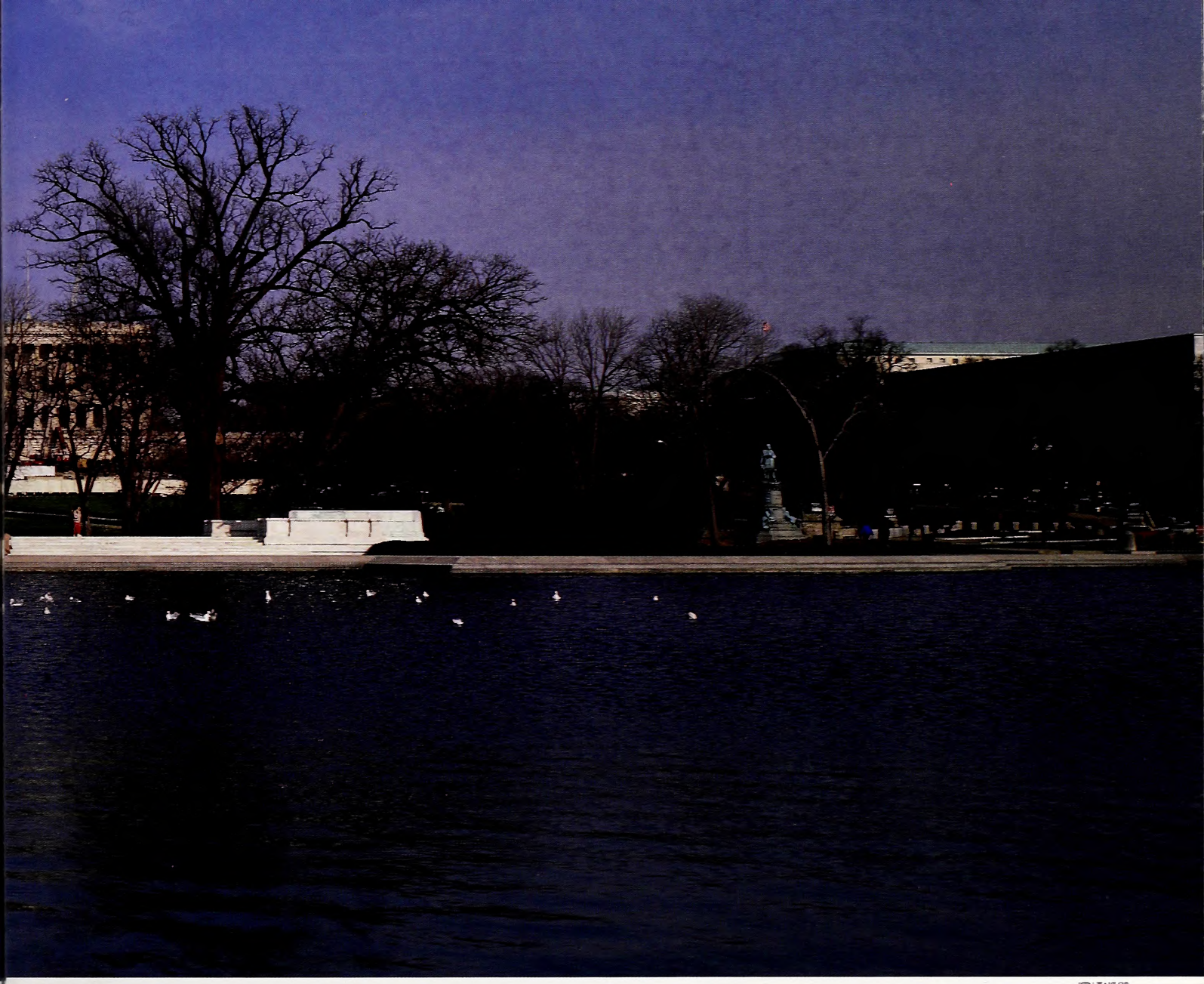
Almost everyone has an opinion about the Endangered Species Act. Before you decide whether it should be reauthorized this year, consider how it has worked so far.

by Janice Nicholls and Nora Murdock

"The last word in ignorance is the man who says of an animal or plant: 'What good is it?' If the land mechanism as a whole is good, then every part is good, whether we understand it or not. . . . To keep every cog and wheel is the first precaution of intelligent tinkering." Aldo Leopold, *A Sand County Almanac* (1949)

We're about to celebrate the 20th anniversary of the Endangered Species Act, but you might want to keep the champagne chilled. The party will have to wait until Congress decides on the Act's fate.

The Act comes up for reauthorization this year and already a spirited debate has begun over its successes and failures. Some say this unique American conservation experiment has saved some species from extinction and brought dozens of others closer to recovery.



KEN TAYLOR

***Congress will take up** a hot environmental issue this year when it decides whether to reauthorize the Endangered Species Act. Some members of Congress want the Act to take human needs more into account. Others want to strengthen the Act's provisions to protect species.*

Critics say it's too expensive, focuses narrowly on individual species rather than on entire ecosystems, and sacrifices human needs to those of often obscure plants and animals. Many environmental groups and legislative experts are predicting the battle will be the stiffest test the Act has ever faced.

Has the Endangered Species Act been a success? More to the point, has it been worth the $700 million that has been invested in conserving the more than 700 endangered and threatened species in the United States?

The answers to these questions may require answering still other questions—and some misconceptions—about what the Act does and doesn't do.

What value do endangered species have?

In the first paragraph of the Endangered Species Act, Congress recognized the value of endangered species when it stated that "endangered species of fish, wildlife and plants are of aesthetic, ecological, recreational, educational, historical and scientific value to the nation and its people."

Yet many people may wonder what connection they have to such vanishing species as the Heller's blazing star and the little-wing pearlymussel. What value could such obscure species have? Yet, commercial freshwater mussel harvesting for the pearl and button trade is a million-dollar industry, and numerous species of blazingstar contain compounds that have proven highly effective in the treatment of various types of cancer.

If species must be viewed as commodities, nature is a virtual warehouse of valuable supplies. Consider these economic reasons for protecting just a few of the plants and animals with which we share this planet:

• Commercial sales of materials from the rosy periwinkle, an obscure plant from Madagascar that contains a compound used to cure childhood leukemia, now exceed $100 million

KEN TAYLOR

Back from the brink, *the brown pelican today stands as a symbol of the Endangered Species Act. Once listed as endangered, the pelican has rebounded so strongly under the Act's protection that it has been removed from the list in North Carolina.*

per year worldwide. Thirty years ago, children with this disease had only a 20 percent chance of survival; today, thanks to the periwinkle, their chances have increased to 80 percent.

• The Pacific yew, once considered a trash tree, is now known to produce a compound called taxol, which is currently in demand as a treatment for ovarian cancer. The commercial value of this drug is expected to reach $49 million per year.

• The collection and sale of wild North Carolina ginseng to pharmaceutical markets generates $2.25 million annually.

There are other "priceless" reasons for saving species. Many rare animal and plant species represent sensitive indicators of overall environmental health and integrity. In addition, nonconsumptive activities such as bird-watching, nature photography and ecotourism give pleasure to millions of people and add billions of dollars to local economies each year. The Act serves vital human needs, not only for new medicines, improved agricultural production, scientific purposes and healthy ecosystems, but also by contributing to an enjoyable, productive human environment.

Even if we decide that we can afford to let some of these species go, are we wise enough to choose which ones? Before penicillin was discovered and saved millions of human lives, who would have fought to save a mold species?

Does it cost billions of dollars to save species?

In 1991 the U.S. Fish and Wildlife Service—the agency charged with implementing the Endangered Species Act—spent $54.5 million to conserve endangered and threatened species in the United States. As the largest annual expenditure in any year since passage of the Act, $54.5 million is a lot of money. But when viewed against the rest of the federal budget, it represents four thousandths of one percent of federal expenditures for that year.

Let's bring it closer to home. In 1991, the Fish and Wildlife Service invested a total of $280,000 in endangered species protection in North Carolina. (This covered 260 rare and declining species at a cost of approximately 4 cents per North Carolina citizen per year.) By comparison, the cost of replacing a one-lane bridge over Little Peters Creek in rural Stokes County was $402,800, and projected costs for the Charlotte Outer Loop, a multilane bypass of the city, are estimated at $2.5 million!

How much would it cost to recover all species presently listed as endangered or threatened? In 1990, the inspector general of the U.S. Department of Interior estimated that it would take $4.6 billion over the next decade. Even if this figure was realistic (this is 6.5 times the total amount spent on endangered species in the first 20 years of the program), how does it compare to other things we spend our money on? Americans spent $4.7 billion just on video games in 1991. In the same year we spent $3 billion on chocolate from just one manufacturer and $20 billion on fast food from one chain. Are we willing to spend more for french fries than for potential cancer cures?

Has the Act been successful?

To recover a species and remove it from the endangered species list is to be certain it is not in danger of extinction anytime within the foreseeable future. To date, five species have been removed from the list in this manner. Two North Carolina species are among those recovered—the brown pelican and the American alligator.

Critics often complain how few species have been removed from the list in the 20-year history of the legislation. Yet it is a mistake to gauge the success of the Act only by the number of species taken off the list. Preventing extinction and stabilizing declining species are significant accomplishments. And by this measure, the Act has been very successful as many species—the peregrine falcon, red wolf and bald eagle among them—are in much better shape today as a result of the Act's protection.

More important, is 20 years adequate to measure recovery of species? As David Wilcove of the Environmental Defense Fund aptly suggests, "In a world of quick fixes and short-term solutions, it is difficult to convince people of the need for a long-term perspective on recovery of species. . . ; the evolutionary forces that create and extinguish species typically operate over a span of thousands and sometimes millions of years. Why do we expect recovery in 10 to 20 years?"

Does the Act need more balance between human needs and species needs?

The Endangered Species Act protects species and their habitats in two ways. First, the Act prohibits federal agencies from jeopardizing the continued existence of listed species. Under this provision, when a federal agency proposes an action—a highway, bridge, dam, etc.—that may affect a listed species, the agency is required to consult with the Fish and Wildlife Service to avoid or minimize impacts. From 1976 to 1991, over 120,000 federal projects were evaluated in this manner for potential conflicts with endangered species. How many were actually stopped by the Act? Fewer than 1 percent. In most cases, negotiations allowed the project to proceed by modifying the project designs to avoid

KEN TAYLOR

***Neatly camouflaged** in its rocky surroundings, the federally endangered peregrine falcon is one of many wildlife species in the United States making a steady comeback because of the Endangered Species Act.*

NORA MURDOCK

***The threatened** mountain golden heather is one of 25 plant species federally listed as endangered or threatened in North Carolina. It is the only plant in the state whose home is designated as "critical habitat."*

KEN TAYLOR

***Protecting species** can mean protecting endangered habitat as well. Good examples are the state-listed Gray's lily (left) and bog turtle (right), two of several rare plants and animals found primarily in mountain bogs. By protecting the rare plants and animals, the Endangered Species Act helps to protect the threatened bog habitat.*

Inside the Endangered Species Act

The Listing Process

Sets up a mechanism for determining which species should be placed on the U.S. List of Endangered and Threatened Wildlife and Plants. The listing process involves review and coordination with the public, the scientific community, other federal agencies and sometimes foreign governments.

Species Protection

Prohibits taking of all endangered animals and allows for extension of these regulations to threatened animals; prohibits taking of endangered plants from federal lands or from private lands in violation of state or other local laws. Prohibits interstate or international trade in listed species without a permit. These protective provisions apply as soon as a species is officially listed.

The Recovery Process

Requires the U.S. Fish and Wildlife Service to prepare and implement recovery plans that may recommend such actions as monitoring, research, habitat enhancement/protection, cooperative ventures with private, state and other federal entities to conserve listed species. The goal of recovery is to restore endangered and threatened species to a point at which they no longer require protection under the Act.

Interagency Consultation

Requires federal agencies to develop programs to conserve listed species and prohibits them from authorizing, funding or carrying out any action that would jeopardize such species or destroy or adversely modify their "critical habitat."

Grants To States

Authorizes annual grant appropriations to assist state conservation agencies with the development of their own complementary endangered species programs.

jeopardizing the species.

The Act also protects species from actions by private landowners. It is illegal for anyone to harass, harm or kill a listed wildlife species without a permit. In some cases, this may include altering habitat significantly. Yet the Act offers several flexible tools for resolving conflicts between private development and endangered species. For example, private landowners can lawfully "take" listed species if it's "incidental to and not the purpose of carrying out otherwise lawful activities" and if the landowner implements a habitat-conservation plan for those species.

Congress intended for this process to provide a framework that would encourage "creative partnerships" between the private sector and local, state and federal agencies in the interest of endangered species conservation. Another example of the Act's flexibility involves public concern over reintroducing large predators back into their native habitats. Under special designation, North Carolina's reintroduced red wolf populations are managed under less strict rules than wild populations so that depredation problems and other landowner concerns can be resolved.

What about truly irresolvable conflicts between projects and endangered species? In the 20-year history of the Act, there have been three such cases—Tellico Dam vs. the snail darter, Grayrocks Dam vs. the whooping crane, and Federal timber sales vs. the spotted owl. The cabinet-level Endangered Species Committee, popularly known as the "God Squad," has the power to exempt a project from the requirements of the Act, even if completion of the project will result in the extinction of a species. Of the three cases, Grayrocks was exempted, Tellico was refused an exemption, and approximately one-third of the Federal timber sales were exempted.

Does the Act stop progress? According to John Sawhill, president of The Nature Conservancy, "A developer faces a greater chance of having an airplane crash into something he built than having a project stopped by the ESA."

Does the Endangered Species Act take a Band-Aid approach to conservation by focusing on single species rather than entire ecosystems?

Even though it focuses on individual spe-

cies for enforcement and implementation, the Act helps to conserve the ecosystems upon which endangered species depend. For example, in the mountains, an exceptionally rare and threatened habitat —the southern Appalachian bog—is home to a host of unique and often stunningly beautiful species, including the bog turtle, the threatened swamp pink, two endangered species of carnivorous plants, bog lemmings, Gray's lily, bunched arrowhead, and several species of orchids. Few people appreciate the value of these isolated wetlands, but they should. Not only are these mountain bogs habitat for endangered species, but they serve as water recharge and purification systems for the cold headwaters that support the area's trout fishery. They also provide drinking water to many mountain communities.

This is only one example of how protecting endangered and threatened species can lead to the protection and restoration of important habitats.

KEN TAYLOR

Does the presence of endangered and threatened species automatically prevent development or other land uses?

The answer is no, despite much misunderstanding on this subject. Indeed, many species can coexist with development if attention is given to their needs. In North Carolina, for example, the red-cockaded woodpecker successfully coexists with military training activities, residential development, golf courses and forestry operations, as long as a certain number of older-aged pines are left for the birds, and hardwood understory is kept under control.

When habitat is considered truly essential to preserve a species, the Fish and Wildlife Service may designate an area as "critical habitat." Yet critical habitat designation does not preclude human use of these designated areas. In North Carolina, three fish and a plant have critical habitat federally designated—the Cape Fear shiner, the spotfin chub, the Waccamaw silverside, and mountain golden heather. A plan to designate critical habitat for the piping plover has generated controversy among some coastal residents who fear that such a designation will close popular beaches to people. The Fish and Wildlife Service reviews all federal government activities within or near the critical habitat area to ensure that listed species are protected. This does not mean that critical habitat becomes a wildlife sanctuary or a wilderness area. Currently, this agency is working with the National Park Service at Cape Hatteras and Cape Lookout to protect this threatened plover while allowing recreational activities.

What effect does designation of critical habitat have on private landowners?

Unless the landowner is planning some project that requires a federal permit or uses federal funds, legally it has no effect.

What about private property rights?

Many critics of the Act believe the law infringes on private property rights. To date, no court has found that the Act has caused unconstitutional takings of private property, nor has such a case ever been presented before the courts.

Can the Endangered Species Act be made more effective?

Yes. Conservation professionals themselves believe that the act can be improved. Friendly criticism includes complaints that plants—half the species on the federal list—get short-changed compared to animals, and that the Fish and Wildlife Service takes too long to list some species and spends more time writing recovery plans than implementing them.

Others believe that the Act should strengthen its emphasis on people. Randy Wilson, chief of the N.C. Wildlife Resources Commission's Nongame and Endangered Species Program, would like to see more incentives for private landowners to protect endangered species. "Where private lands play an important role in recovery," he says, "there is a need to develop landowner incentives to help conserve species such as red-cockaded woodpeckers." Katherine Skinner, executive director of the North Carolina field office of The Nature Conservancy, would like to see endangered species protection integrated more with existing land uses, including game management, farming and development. "The key to accomplishing this is flexibility with site-specific approaches," she says.

As the debate over the reauthorization of the Endangered Species Act continues, it bears remembering that, though a powerful tool, the Act has a specific purpose—to protect the ecosystems upon which endangered and threatened species depend. The Act is not a substitute for other land protection and zoning laws, even though people are often tempted to use it in an attempt to stop otherwise legal activities. "The Act was intended to serve as the emergency room for species nearing extinction," says Faith Campbell, senior research associate for the Natural Resources Defense Council. "Preservation of overall biodiversity will require other mechanisms. We cannot blame the Act for not solving all of our environmental problems, since it was never intended to do this."

Indeed, to conserve the wild things with which we share our planet and to ensure a healthy system in which to live and prosper, we need something more—a conservation ethic that blends a respect for the land and its inhabitants with an understanding of our own place in the web of life around us. If the incredibly rich diversity of life on earth is to be sustained, we'll have to do better than "business as usual." We'll have to give a bit more time, plan more carefully and at times suffer some inconvenience. A conservation ethic will require that we look beyond our own short-term wants and needs. The evolution of such an ethic will require an immense perspective. ☒

Janice Nicholls and Nora Murdock are biologists with the Asheville office of the U.S. Fish and Wildlife Service.

MURDER on a Stick

If the praying mantis is not really vicious, just hungry, then how did it get such a ghastly reputation? Here's how.

written and photographed by Harry Ellis © 1993

Many people believe that the heights of drama in nature are reserved for a relative few wealthy adventurers who are able to journey to remote lands in search of exotic phenomena. The rest of us have to stay at home to earn a living, and must get our thrills second-hand from nature films. There are, however, nearby realms as close as our own dooryards filled with strange and fantastic forms of animal life. Take, for example, the praying mantis. Of all the creatures that make up the animal kingdom, it has fascinated me more, perhaps, than all the rest.

Because of their ability to turn their heads like humans and follow one's every movement with big, round, staring eyes and, because the front legs are habitually folded like hands in prayer, these strange insects have been regarded by many cultures with superstition, awe and reverence. The ancient Greeks believed they possessed supernatural powers and called them "soothsayers" and "prophets." The Moslems thought that they always turned their faces toward Mecca when they were holding their front legs in a prayerful attitude. In the Deep South of our own country, they are sometimes called "Devil's Coach Horses" and regarded with superstition and fear.

The praying mantis (or mantid, as it is also called) is really a ferocious creature, a tiger of the insect world. It will stand motionless for hours at a time with its forelegs clasped and held out before it like the arms of a praying monk, a characteristic posture that inspired its common name. But let not its sanctimonious demeanor fool you. It waits not for inspiration but for insect prey to satisfy its gluttonous appetite. Even when stuffed with insect prey, it waits for more. Of patience it has a double measure, the basic requirement for a creature that lives by waiting or stalking. Should an unwary insect stray within range, out shoot the heavily spined forelegs with lightning swiftness and the captive is trapped in a deathly embrace from which there is no escape. The mandibles cut out a gaping hole in the soft flesh and the victim is literally eaten alive.

Despite its voracious appetite, the mantis often seems in no great hurry to finish the feast, but firmly holding the struggling creature like a steel trap, it raises its head from time to time and calmly looks about. Often the least vital body parts are eaten first, prolonging the captive's ordeal.

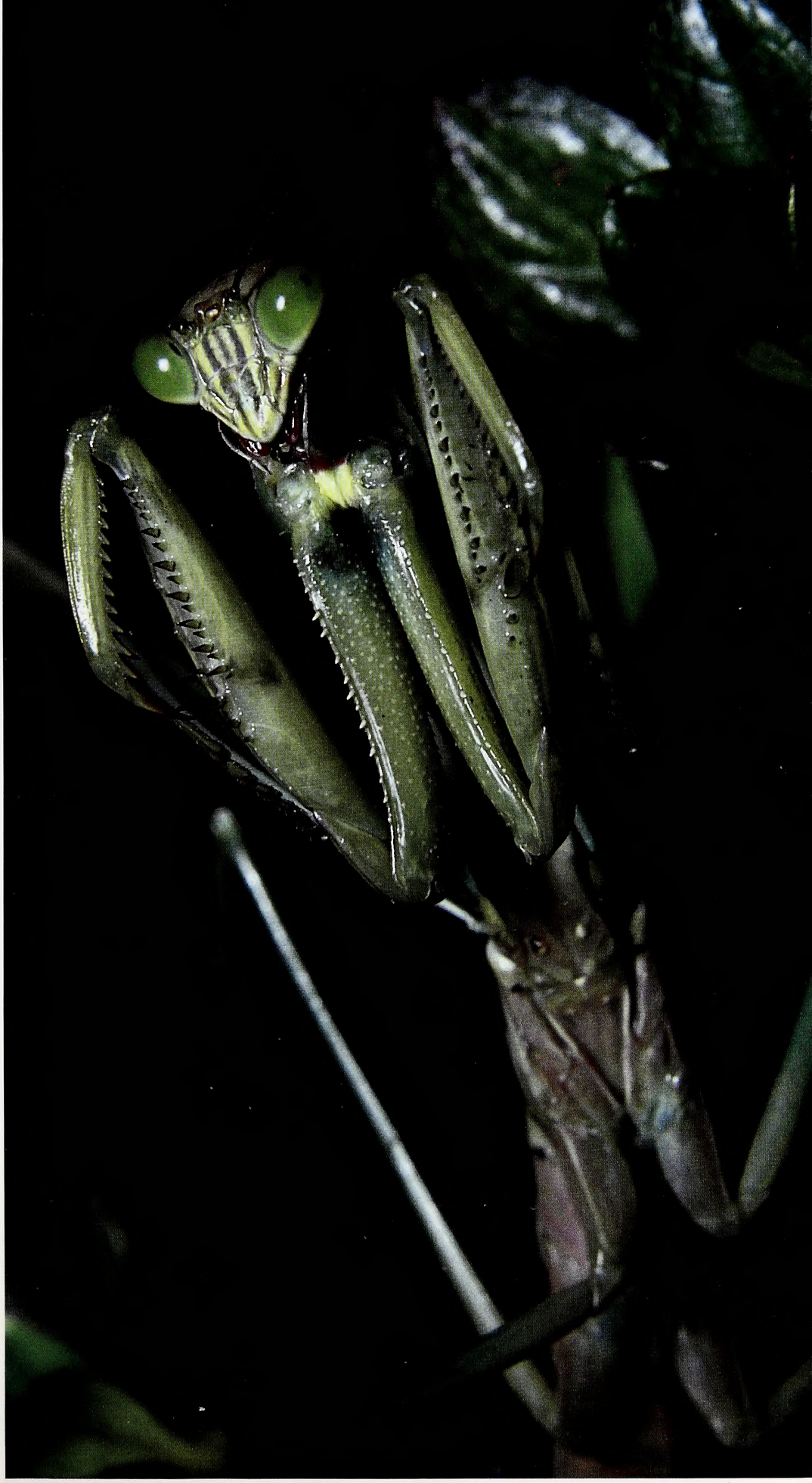
Though the words, "murderer," "assassin,"

***These young** praying mantis (left) disperse along a stick shortly after hatching. Though they still have their pale juvenile coloration, they are fully ready to hunt their own food. The last thing a lot of insects see is the looming form of a praying mantis (right), its claws poised to attack.*

and "butcher" are sometimes used in describing the praying mantis, these terms are clearly out of place in speaking of any form of animal life. Throughout nature, a great proportion of wild creatures are able to survive only by means of killing. Hunger is the first and most universal of all experiences; to satisfy that hunger and maintain life, other lives must be sacrificed. Nature intends no cruelty, begets no criminals. Quick and sometimes violent death is the expected end of most wild animals; few ever die of old age. The bared fang dripping with blood is as much a part of nature as the gleaming sunset, the rainbow, or the flash of a tanager's wings in the June woods.

From the day it is born, the praying mantis is a carnivorous creature, ready to do battle with any foe, and will capture and eat only living, moving prey. The menu varies from crickets, grasshoppers, beetles and spiders to bumblebees, wasps, caterpillers, moths and butterflies, or almost anything else that comes its way. A cannibal from birth, it will just as quickly eat its own kind as some other insect. Since these predators capture many insect pests, such as Japanese beetles, they are considered highly beneficial to farmers and gardeners, and have even been introduced into some areas. However, this value is diluted, somewhat, by the fact that they kill almost as many useful insects, like honeybees and butterflies, as harmful ones. Many people with whom I have talked believe that the praying mantis is protected by law and that a person who kills one will be fined. Actually, no such law exists.

Mantids are found in all regions of the Earth with a mild or warm climate, reaching their greatest abundance in the tropics. At least 1,800 species are known worldwide, and 15 or so in the United States, most of them from the South. One European and two Asian species entered our country accidentally in the form of egg-masses on nursery stock, and have spread rapidly to become thoroughly naturalized and abundant throughout most of the eastern United States. One of these, the Chinese mantis (*Tenodera aridifolia sinensis*) is now our most abundant species. In western North Carolina, where I live, it represents at least 95 percent of the mantids found. The life histories and habits of all the different species are very similar, for there is only one basic mantis way of life.



The praying mantis has a slender, elongated, bony-armored body, strong hind legs, and a long tubelike prothorax that carries the front legs, and that has the appearance of a long giraffe-like neck. On a little odd-looking, triangular face are two large, bulging, compound eyes, with a free-swiveling head that enables the mantis to look from side to side and even over its shoulder. No other insect is able to do this. These features, when viewed close up, suggest a prehistoric monster in miniature. Apparently it has excellent vision, allowing it to pinpoint the position of its prey with extreme accuracy.

Mantids walk with a slow ungainly gait and have strong wings, though they use them only infrequently, generally preferring walking to flying. That they are capable fliers when necessary is evidenced by the fact that they are often seen at windows near the top of tall skyscraper buildings in New York City, including the Empire State Building, probably attracted by the bright lights.

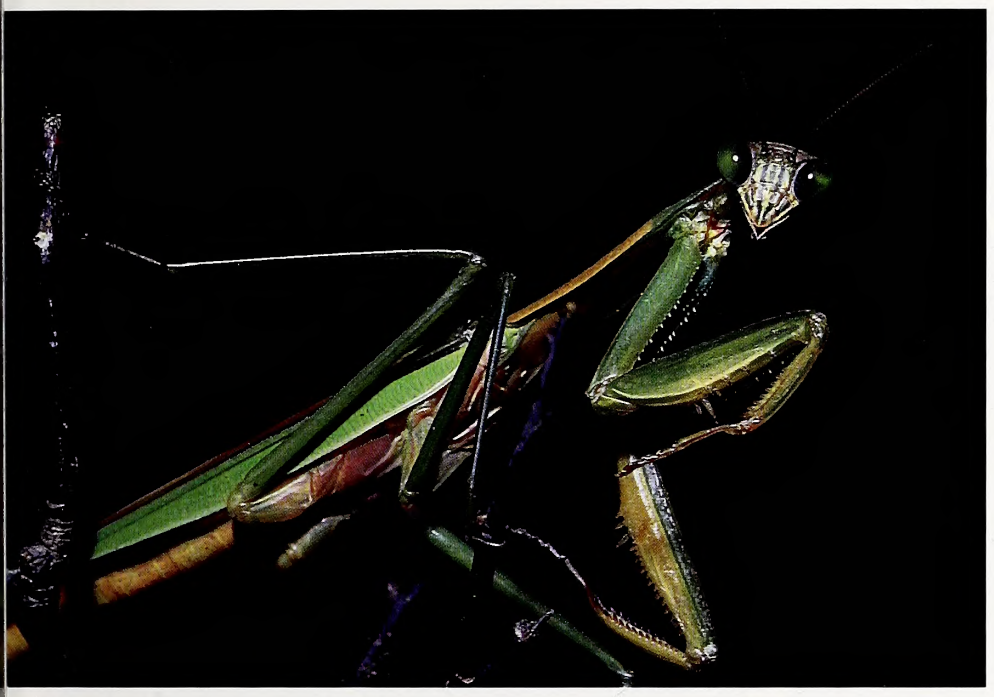
Of all insects, mantids are probably best equipped for capturing and killing their prey, and perhaps their greatest adaptation for survival is the development of camouflaging colors and patterns that enable them to accurately blend with their natural surroundings and make themselves harder to see. Protective coloration is developed to a fantastic degree in many forms of mantids. Generally, those living in moist areas, where the vegetation is predominantly green, have developed green colorations and patterns, while those living in drier habitats, among dead leaves on the forest floor, or on the bark of trees, have become cryptically colored in grays and browns. Certain bark mantids are almost indistinguishable from tree bark. Camouflage permits these predators to remain virtually invisible until their victims approach within range, and also to conceal themselves from their own enemies such as birds and certain predatory mammals. Sometimes, if a stiff breeze is blowing as it waits for prey, a mantis will heighten the deception by gently swaying its body from side to side in evident imitation of the movement of wind-blown leaves and branches.

Many tropical species are colored and shaped in astonishingly exact imitation of the parts of certain flowers that bloom in the region. These bright-colored mantids—some are white, some pink, others blue or purple—always search for blooms that closely match their own shape and color. The white ones find white flowers; the pink ones, pink flowers; the blue ones, blue flowers. Then, perfectly camouflaged, they wait for prey.

After mating in early autumn, the female, in a ghoulish feast, may devour the male. I have no doubt that this sometimes occurs, for other observers have witnessed it, but in the many years I have spent following and observing these insects, I have never seen it happen. I do know that the male often walks away unharmed, probably in the majority of cases.

Masters of camouflage, *the various species of praying mantis can match their preferred backgrounds almost exactly. This mantis looks like a bit of tree bark.*

Following mating, the female stands head-downward on a weed stem or twig and deposits 200 or more eggs inside a frothy mass that soon hardens into a tough, waterproof egg-case. In our most common species—the Chinese mantis—the case is about the size of an English walnut. It will protect the eggs through winter's lashing gales and freezing temperatures and into a new spring, when it will "explode" with life. To this egg mass, the female commits all her tomorrows and the future of her race. Her work finished, the clock of her own life is slowly running down, never to be rewound. When egg laying is completed, she departs with never a backward look. Like all others of her kind in Northern and temperate regions, she will die in the first hard frosts of autumn. Through winter's howling storms and falling snow, the future of the species rests upon the hundreds of egg cases scattered throughout the countryside.



***Praying mantis** (left) have armored bodies that give the appearance of a small dinosaur. Their ability to swivel their head about to look in any direction is unique among insects, and gives them a certain human quality. Young praying mantis (below) dangle from silken threads after hatching from the egg case.*

These egg-filled cases are the mantid's only link between the summers.

Sometime in late spring, at about the time that baby cottontails are leaving their nests to explore the green, sunlit world of daisies and clover, the egg cluster comes to life and hatching begins. The baby mantids wriggle out of the case and hang head-downward on silken threads, clustered together like a bunch of bananas. Looking like miniature adults, they are honey-yellow with black eyes, and not much larger than mosquitoes. At first they can eat only tiny insects like aphids, but as they grow, through a series of molts, they are able to capture and eat larger insects, including their own brothers and sisters.

The period immediately after hatching is the most dangerous time in the life of the praying mantis, for their enemies are numerous. The great French entomologist J. Henri Fabre estimated that from a thousand hatching mantids, perhaps two may escape their enemies and survive to become mature adults. This sacrifice of the individual for the good of the race caused poet Alfred Tennyson to remark in one of his poems, as a kind of scolding reproach of nature:

"So careful of the type she seems,
So careless with the single life."

The conduct of the praying mantis is dictated by instinct alone. While man has climbed the ladder of achievement by his superior reasoning powers, these amazing insects have mainly progressed by developing physical adaptations and instinctive behavior that meet the complex demands of their environment. Over many centuries, they have excited the ancients, engrossed naturalists, and will continue to stir the imagination of generations yet to come—to puzzle, perplex and fascinate them. ⊠

Largemouth Bass Most Popular Fish

Wildlife Commission Surveys State's Freshwater Anglers

Written and Edited by Vic Venters

We didn't ask for the location to favorite fishing holes, but a recently conducted opinion survey is telling the N.C. Wildlife Resources Commission just about everything else about the state's freshwater anglers.

In 1990, 5,832 names were randomly selected from the state's lifetime and annual fishing license holders. Each angler was sent a questionnaire of 26 questions. From this number, 3,251 anglers returned forms, for a statistically reliable 55.7 percent return.

There were 2,732 male respondents and 339 female respondents. Answers to questions were analyzed on a statewide and regional perspective.

While angler preferences and opinions varied from one region to another, a few statewide trends clearly emerged:

North Carolina anglers like to fish—and often! Over 65 percent of respondents made 10 or more trips each year, while about 42.5 percent made 20 trips or more.

Most respondents—87.6 percent—rated their overall fishing success to range between fair to very good. A sizeable number—42.3 percent—considered their success good or very good.

Reservoirs proved to be the most popular places to fish statewide; however, angler satisfaction was highest at small ponds with high catch rates.

Almost 70 percent of respondents fished for largemouth bass, making it the most popular of North Carolina's freshwater gamefish.

Crappies came in a close second in popularity with a 61-percent following, while sunfish species came in third with a 42-percent following.

These three were followed, in descending popularity statewide, by catfish, mountain trout, smallmouth bass and striped bass. In the mountains, however, trout, smallmouth bass and walleye were more popular with anglers.

Most anglers—about 77.5 percent—preferred to catch several medium-sized fish to one large fish or many small fish.

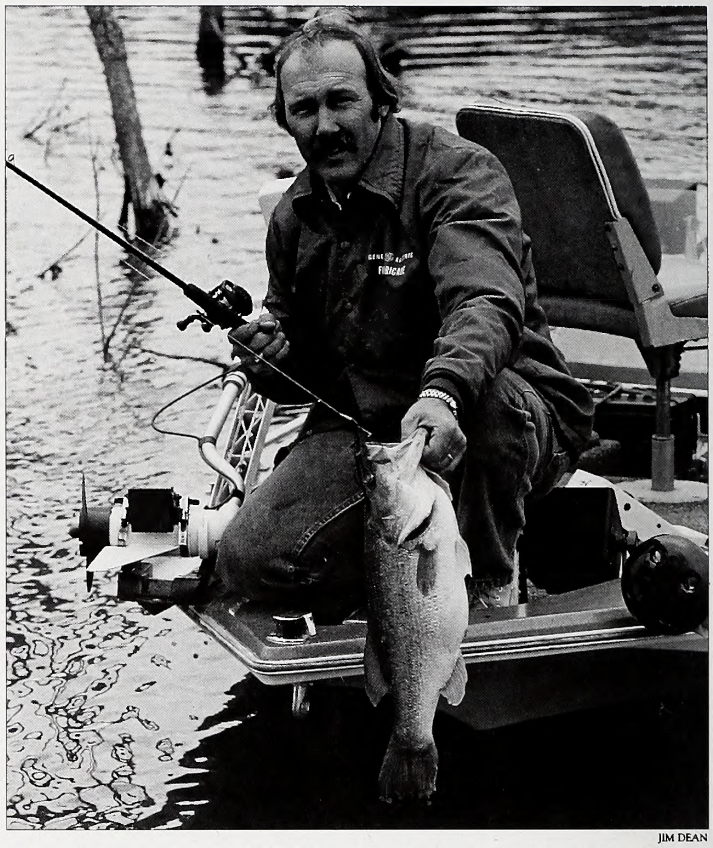
About 50 percent of the respondents statewide held neutral attitudes toward fishing tournaments, while 37.1 percent supported tournaments. About 13 percent of anglers opposed fishing tournaments. About 10 percent of respondents were members of organized fishing clubs.

Judging from the responses, North Carolina anglers appear to be increasingly concerned about the effects of pollution and development on fishable waters.

Pollution was judged to be the most serious problem, with over 43 percent of respondents indicating that this was the greatest factor limiting the quality of their fishing experience. Another 31.8 percent were concerned about the impact of commercial and residential development on fishing.

Over 33 percent also believed overfishing was hurting their fishing experience. About 31 percent of respondents said they'd like to see catch limits reduced statewide, while only 7.3 percent said they'd like to see catch limits increased.

Increasing fish habitat was the No. 1 vote getter among fisheries management program. Other popular management work was increasing the number of bank-fishing areas and piers.



JIM DEAN

***According to a recent** Wildlife Commission survey of North Carolina anglers, over 70 percent fished for largemouth bass, making it the state's most popular freshwater gamefish.*

Plasschaert Paints Ruffed Grouse

Sportsman's Stamp and Print Available

A ruffed grouse flushing in a stand of hardwoods is featured on the tenth edition of the N.C. Wildlife Resources Commission's Sportsman's print and stamp series. For a full-color reproduction, see the inside back cover of this month's issue.

The painting for the combination print and stamp was painted by internationally known artist Richard Plasschaert, the artist who painted a pair of mallards for the first North Carolina duck stamp and print in 1983, and widgeons at Bodie Island Lighthouse for the 1992 state duck stamp and print.

Prints and stamps will be available through Dec. 31. Wildlife Commission policy requires that unsold art prints and stamps be destroyed six months after the stamps expire as legal licenses.

This measure limits the numbers of prints and stamps available on the market, thereby increasing their value as collectibles.

For more information, contact art dealers or the license section of the Wildlife Commission at 512 N. Salisbury St., Raleigh, N.C. 27604-1188, or call (919) 662-4370.

—Bodie McDowell

Slated September 11-12

New Bern Hosts Wildlife and Sportsman's Show Next Month

Over 20,000 visitors are expected to attend the Sixth Annual Wildlife & Sportsman's Show in New Bern on Sept. 11-12.

The show will feature juried art, conservation exhibits, custom and sporting collectibles, and sporting goods and services. Events and exhibits will be located in five pavilions within walking distance of each other in downtown New Bern. Marksmanship and retriever demonstrations, boat shows and other events will be held in riverfront parks.

Phillip Crowe, who painted the 1991 state duck stamp, was named Featured Artist for this year's show. Royalties from the sale of this year's featured print, "Mattamuskeet Morning," will benefit the national wildlife refuge's Wildlife Habitat Management Program.

For more information, contact the New Bern Area Chamber of Commerce, P.O. Box C, New Bern, NC 28563, or call (919) 637-3111.

Phillip Crowe's painting *of tundra swans and canvasbacks, titled "Mattamuskeet Morning," is the official print of the 1993 N.C. Wildlife & Sportsman's Show in New Bern.*

Calendar

On several occasions, events in this calendar have been changed without notice. Listings should be conservation oriented and should be sent at least four months in advance. Readers should check the contact before traveling to an event.

September 11-12

The 12th annual Currituck Wildlife Festival will feature wildlife art, woodcarvings, decoys and photography. To be held at Currituck County High School in Barco. Proceeds will go to benefit the proposed Currituck wildlife museum. For more information, write the Currituck Wildlife Guild, P.O. Box 91, Shawboro, N.C. 27973, or call Nancy Sanderlin at (919) 232-3297.

Book Review

By Phillip Manning: Afoot in the South

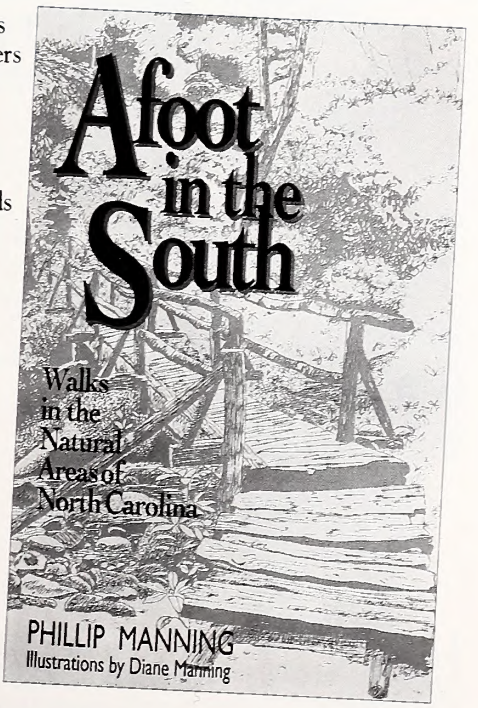
Afoot in the South by Phillip Manning. Published by John F. Blair. Softcover, 256 pages, 1993, $12.95.

While there have been many books published recently on the natural areas of North Carolina, few combine as much practical information with a sense of place as well as Phillip Manning's new work, *Afoot in the South*. In it, Manning takes readers on walks through 18 different types of natural areas across North Carolina's mountains, Piedmont, Coastal Plain and barrier islands.

Using narrative to describe each hike, the author skillfully weaves in snippets of ecological information, cultural history and often the dialogue of local guides or personalities. He then ties it all up with simple yet elegant prose. The resulting descriptions bring these areas alive for the reader.

Each chapter includes addresses, phone numbers and trail maps of the selected park, refuge or natural area, as well as a listing of local accommodations, campgrounds and chambers of commerce. Also included with each chapter is a useful bibliography of books and publications, both popular and scientific, that are pertinent to the featured area. The book is illustrated with pen-and-ink illustrations by Diane Manning, the author's wife.

All and all, *Afoot in the South* will be of interest and use to both experienced walkers of the woods or those starting out on their first hike in the state.



Commission Employee Elected President

Marti Kane Leads Education Group

A Wildlife Commission employee with the Division of Conservation Education has been elected president of Environmental Educators of North Carolina.

Marti Kane, an education specialist based in New Bern, was elected to the post last fall.

EENC is a membership organization for environmental educators across the state. The goal of the group is to foster communication between North Carolina's environmental educators and to promote and support environmental education efforts in the state.

Kane has a degree in wildlife biology from Framingham State College in Massachusetts and a master's degree in environmental education from the University of Wisconsin. She came to the state in 1980 to work as the education coordinator for Catawba Science Center in Hickory. She later taught science for four years at West Junior High School in Alexander County.

Field representatives for the Division of Conservation Education conduct Project WILD workshops for educators, who then go on to teach the conservation workshops to their students. Kane sees her involvement in EENC as a natural extension of her job with the Wildlife Commission.

"I love my job because I can assist hundreds of teachers to implement environmental education in their classrooms situations and I can support community-based efforts in environmental education," Kane explained. "I feel that Project WILD and other Commission programs are making a difference in people's attitudes and behavior towards wildlife."

EENC is actively seeking new members. For more information, contact EENC, P.O. Box 4901, Chapel Hill, N.C. 27515-4901.

Wildlife Endowment Fund Report

May 1993

Principal Balance
$18,187,787.30
Interest Earned
$11,656,624.51
Total Receipts
$29,844,411.81
Interest Used
$4,123,817.48
Fund Balance
$25,720,594.33

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

Follies at Your Feeder

by Vic Venters

In the past we've written about the importance of keeping the feeding bins and perches of bird feeders clean, especially in hot and humid months like August when diseases can proliferate. We should add that it's a good idea to clean all parts of the feeder, including chains, wires and feeder tops—anywhere birds can perch or cling. Scrub with a mild chlorine/water solution, then rinse well and let dry before adding food.

Squirrel Shenanigans: Neighborhood squirrels can be awfully cute, but when they find out how to get at the pricey bird food in your feeder, they can be awfully expensive, too. While pole feeders can be protected, hanging feeders are harder to squirrel-proof.

One good way to foil the rodents is to erect diversion feeders. One of the simplest diversions is hanging a corn cob by an eye screw on a chain. In itself, this can provide amusing moments as the rodents dangle and dance for a grasp on the corncob. You can also set up feeders specifically for squirrels and feed them livestock corn, which is cheap and readily available.

Insect Invasion: A major problem with summertime hummingbird feeders can be infestations of stinging insects. They are distracting to hummingbirds and hinder your feeding and cleaning efforts. A useful tip for ridding feeders of stinging insects comes by way of the *Bird Watcher's Digest*, an excellent bi-monthly magazine for birding enthusiasts.

They recommend placing a hummingbird sugar solution in a small container on the ground near the feeder. An old jar lid works as a container. Pretty soon, the insects will begin keying in on this food source instead of the harder-to-get solution in the feeder. Each day, move the container a little farther from your feeder. The insects will follow this food source, as they prefer feeding near the ground. Once you establish this source of reliable nectar, insects should leave your feeder alone. Place the lid of nectar on a brick or small stone to prevent anyone from stepping in it and possibly getting stung.

N.C. Wild Store

Take advantage of these great items and you'll support conservation education throughout North Carolina. Proceeds from the sale of these publications will support the development and production of educational projects and programs.

"North Carolina WILD Places will become a standard reference...The book combines accurate descriptions and illustrations in a way sure to attract both casual and serious readers. It really is a wonderful addition to the literature about the natural heritage of our state."

—Fred Beyer, Past President, N.C. Science Teachers Association

North Carolina WILD Places Map Print

Charming, signed limited-edition art print showing North Carolina's wild places as seen by artist Jackie Pittman. 1,000 limited-edition and 100 artist's proof prints. Also available as a poster. 36" x 24".

Item code **E2-4**

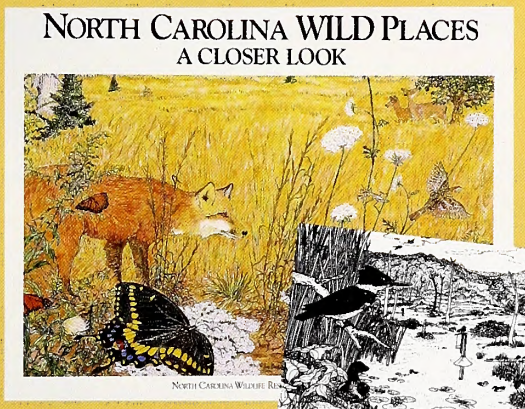
Article Reprints from Wildlife in North Carolina Magazine

"The Spawning Runs." Informative article on the anadromous fish of North Carolina. Two-page map.

Item code **M4**

"Gardens for Butterflies." For the gardener who wants to attract some of nature's most colorful creatures. Species to plant, butterflies that will visit.

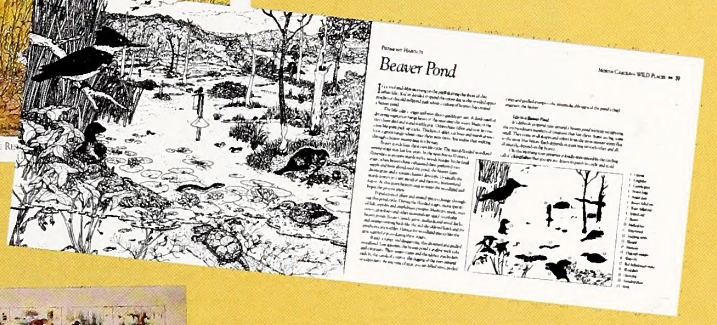
Item code **M5**



North Carolina WILD Places: A Closer Look

Easy-to-read text and Anne Marshall Runyon's delightful illustrations make wildlife habitats come alive in this 82-page book. Discusses 13 habitats across the state.

Item code **E1**



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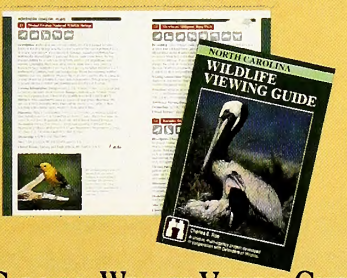

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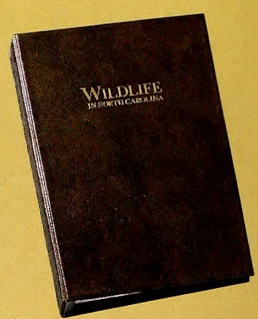

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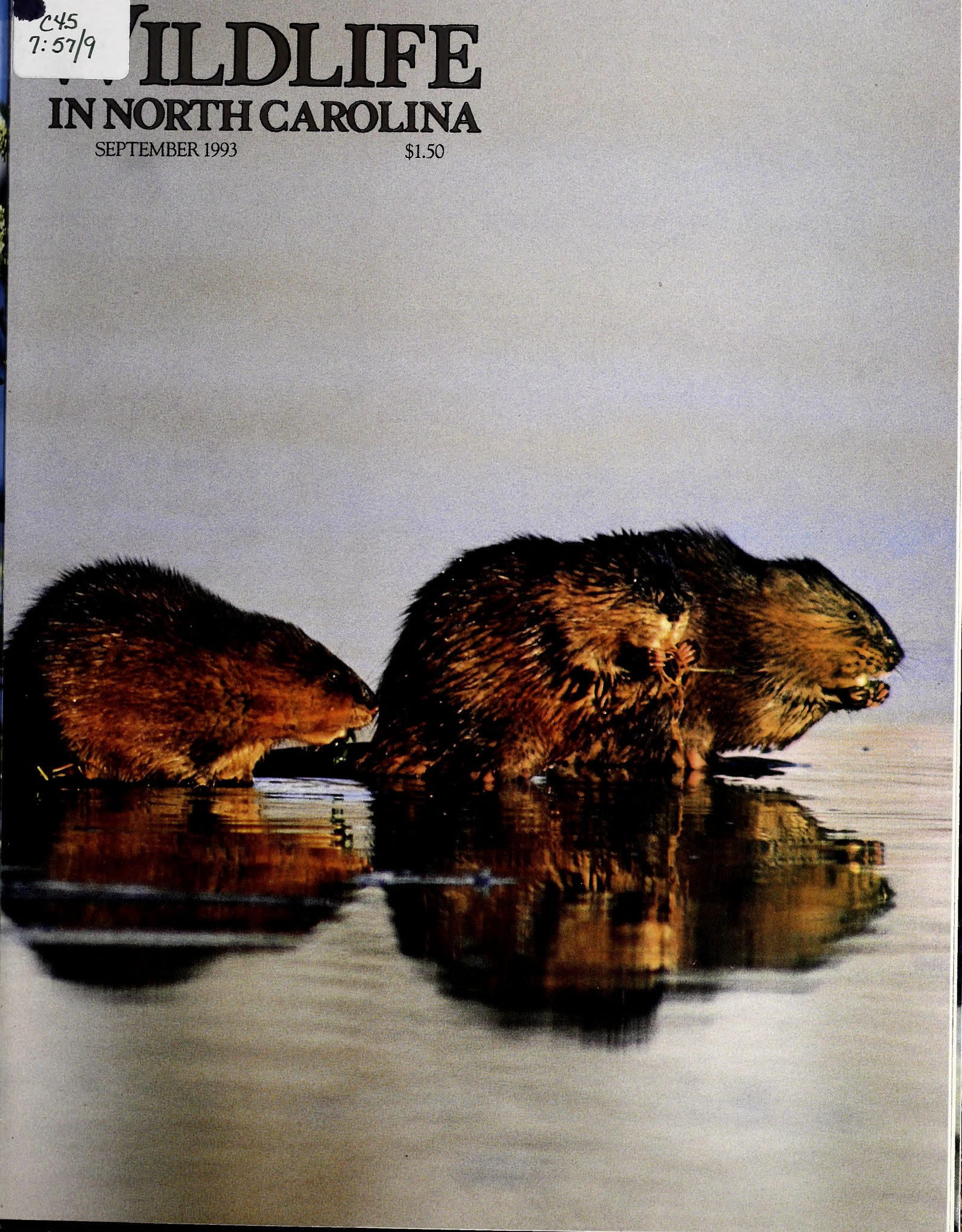


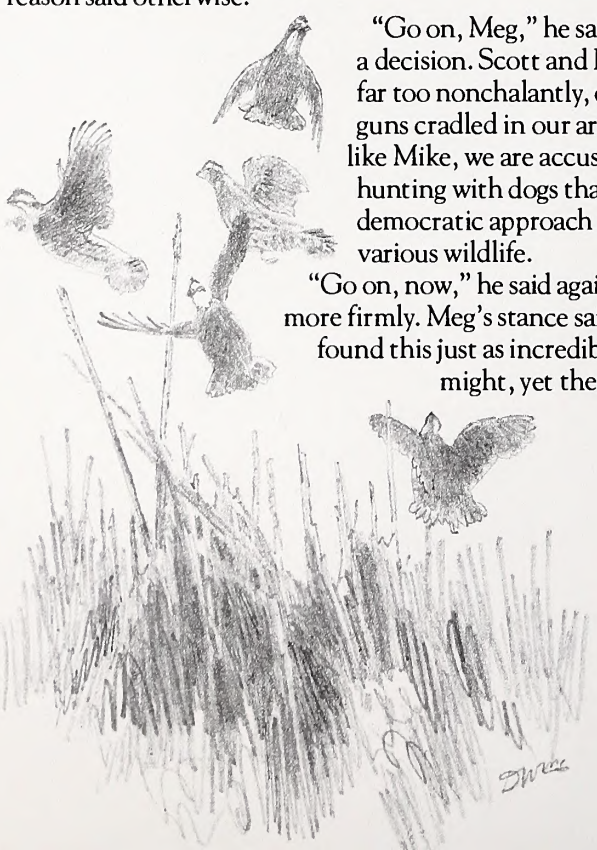
Birds out of Hand

by Jim Dean

We crossed the big field, snagging our boots now and again on wiry runners of brier and honeysuckle hidden beneath the dead grass and broomstraw. Ahead, we saw Meg momentarily in the opening under the big oak that stood in Estore's yard. Or rather, it would have been Estore's had he not been dead 40 years and his frame tenant house abandoned. His face couldn't be called up by anyone still living on the farm—perhaps nowhere on earth—but in the peculiar ways that places are tagged, Estore has stayed to watch over the old tin-roofed house, its sagging porch, tilted lightning rods, the shaggy, blue cedars and the sentinel oak.

Meg, we knew, would be checking out the smaller bean field behind the woods up to our left, and would circle back about the time we reached the house. On gray late afternoons like this one, it is an unspoken habit to stop and sit on the edge of the porch for a few minutes. Time enough to scratch a good dog's ear, get a drink from the well or catch a few deep breaths of cold, pine-scented air. Meg knows this, and she was waiting as we crossed the dirt path.

Something, however, wasn't exactly right. Meg turned suddenly and began to inspect the brush alongside the house, then came to a tentative stop looking under the porch. It was a sort-of point, uncertain and uncharacteristic. In a young dog, you would immediately think terrapin or rabbit or snow birds, and that is what crossed Mike's mind in that instant before reason said otherwise.



"Go on, Meg," he said, urging a decision. Scott and I paused far too nonchalantly, our shotguns cradled in our arms. Unlike Mike, we are accustomed to hunting with dogs that take a democratic approach to various wildlife.

"Go on, now," he said again, a bit more firmly. Meg's stance said that she found this just as incredible as we might, yet there was all this unlikely evidence wafting to nose right here under these sagging boards. She took a step and stiffened tail high, but it was too late. We had failed her. There was a muffled rattling underneath, and the covey —10 or 12 birds—blew out in a roar from under the end of the porch. Slack-jawed in disbelief, we watched them go in a tight pattern like pellets from a giant gun barrel.

Mike tossed his cap on the ground in self disgust. He seldom makes that kind of mistake; his dogs almost never do, and wouldn't then without our help. Yet there it was. Cardinal rule No. 1 in tatters. Trust your dog. Still, we marveled. In all our combined years of bird hunting, we could not recall ever finding bobwhites under a house. But here were the roosts, pearly droppings in several piles where the birds had circled their wagons on previous evenings, backing up to one another for warmth and protection in their characteristic tail-in ring.

We consoled Mike while he apologized to Meg, but Meg was more keenly interested in setting matters right than holding a grudge.

"They went down the edge of those woods at the head of the pond," said Scott. "Should be in or near that thicket."

We took our break, and let the birds settle down. After all, they most likely had not scattered far since no shots had been fired. With Meg ranging handsomely ahead of us, we spread out and entered the woods walking abreast, guns ready this time. A hundred yards deeper into the gloom, we began to find birds. Two on the ground ran through the undergrowth like Mohicans, then flushed beyond range. Another exploded head-high out of a tree after waiting until we had passed. Two others had also lit in trees, but instead of giving us a shot, they swooped to within inches of the ground and buzzed through brush like low-level night bombers.

The others simply vanished though I swore later I had seen one wearing a helmet peep out at me from a machinegun bunker. The score was zip. We stood at the end of the woodlot in astonishment. Meg shrugged, but she knows more about birds than we ever will, as she had ably demonstrated earlier.

Mike just shook his head in admiration. "I don't think we have to worry too much about those birds. They've hidden under a porch, run when they should have flown and lit in trees like no bobwhite Nash Buckingham ever knew. When they absolutely had to fly, we'd have done better hitting them with a sand wedge. I'd say that covey is well-adapted to survival."

This past spring, as I drove up to another old house near Estore's that I have renovated as a camp, I flushed a pair of quail. They were under my porch. In late July, I flushed their brood from under the same porch. They flew in a loose formation of about a dozen, wavering uncertainly on novice wings, looking for all the world like puffball recruits in newly-assigned Spads.

I may not have to clean my gun all season.

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Cover *Four muskrats feed on a flooded, shallow mudflat at dusk. For other photographs of wildlife species and their reflections, see "Mirror Images" on page 10. Photograph by William S. Lea.*

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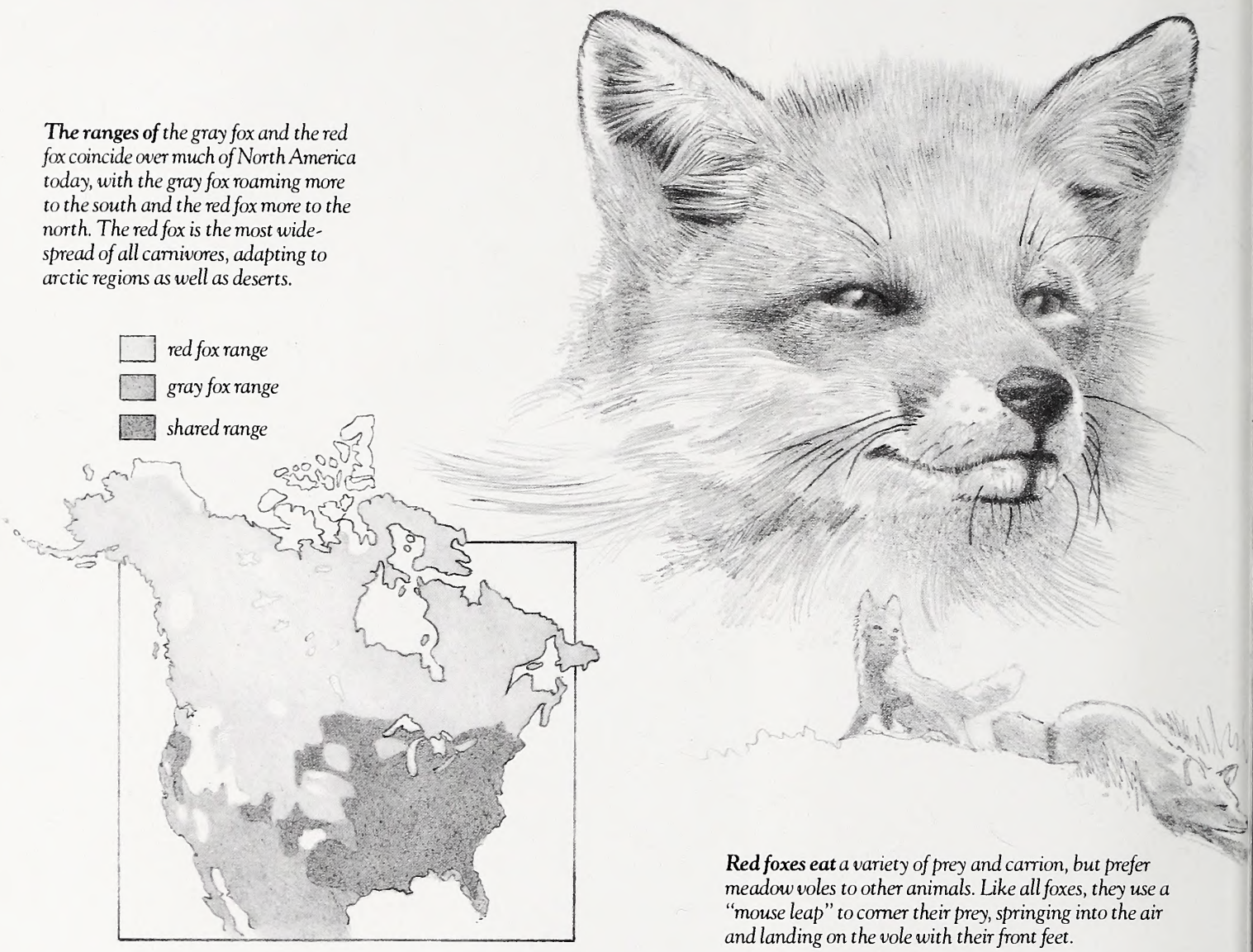


***The ranges of** the gray fox and the red fox coincide over much of North America today, with the gray fox roaming more to the south and the red fox more to the north. The red fox is the most widespread of all carnivores, adapting to arctic regions as well as deserts.*

***Red foxes eat** a variety of prey and carrion, but prefer meadow voles to other animals. Like all foxes, they use a "mouse leap" to corner their prey, springing into the air and landing on the vole with their front feet.*

Foxes on the Run

written by Lawrence S. Earley
illustrated by David Williams

Scientists are still not completely sure when or why the red fox, so common today, first appeared in the Southeast. Although the evidence is murky, what seems clear is that the gray fox was the only fox species in the woods when the first European settlers arrived. It took awhile before the red fox appeared.

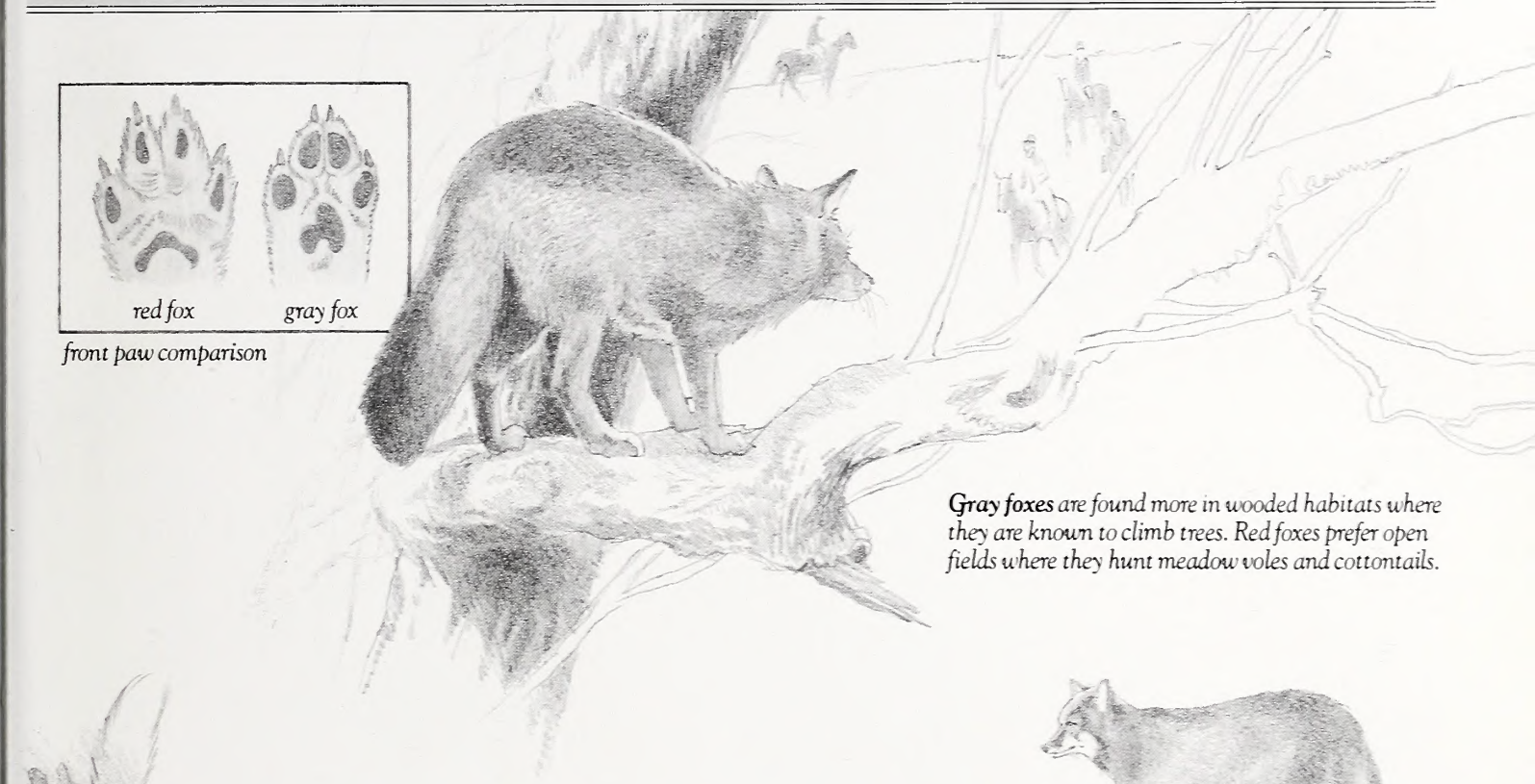
Why that happened is a fascinating story of hunches and hypotheses involving habitat alteration, ecology, climate change and even human homesickness.

Some scientists have suggested that the red fox was native to the northern part of the continent before European settlement, ranging perhaps no farther south than Quebec. Restricting its southward movement along the East Coast was the mighty hardwood forest that once flowed from the Atlantic Ocean to the edge of the midwestern prairies. This forested habitat was the haunt of the gray fox whose eastern distribution seems to coincide remarkably with the original extent of the great eastern deciduous forest. Even today our native gray fox is less visible than the red fox because of its woodland haunts and nocturnal habits. Gray foxes have a slightly southern distribution on the continent of North America, ranging from northern Venezuela and Colombia to southern Canada.

The red fox, on the other hand, frequents open spaces more than its gray fox kin. That may be the reason why it is considered the most widespread of all carnivores, found throughout North America, even up into the Arctic regions, through Europe and Asia and also in parts of North Africa.

Thus, as settlers began to fell trees and clear fields, they were creating perfect habitat for the red fox. Yet habitat alterations

front paw comparison



***Gray foxes** are found more in wooded habitats where they are known to climb trees. Red foxes prefer open fields where they hunt meadow voles and cottontails.*

***The gray fox** is slightly smaller than its red cousin and its tail is less bushy. The gray fox has a black-tipped tail; the red fox's tail is tipped with white. Although predominantly gray, the gray fox can also have reddish patches over its body and thus is sometimes confused with the red fox.*

may not explain everything about the southward movements of this fox. Indeed, one biologist suggests that red foxes may have been present as far south as Pennsylvania as early as 1,000 AD, but they didn't remain.

What was happening? The key might well have been climate change. Over the last several thousand years, cooling and warming mini-trends have occurred a few times, with red foxes moving south as the climate cooled, north as it warmed. One of these cooling trends occurred in the 17th and 18th centuries, possibly adding a little climatic push to the red fox's movements into the open habitats created by settlers.

Habitat change, ecology, climate—surely these factors explain the red fox's slow infiltration into southern woodlands. But there's another, which we might dub "the homesickness factor." Fox hunting, an old tradition among the English, disappointed colonial hunters at first. Instead of getting spirited chases over hill and dale, hunters in the South found that the native gray fox, after only the briefest of runs, scurried up a tree and refused to budge. "When hunted, [gray foxes] make a sorry Chace, because they run up Trees, when pursued," complained 18th-century explorer John Lawson. Indeed, the gray fox is known as the "tree-climbing fox," an adaptation derived from its long association with forests.

To compensate, the English introduced red foxes from England, and the gray fox was left to its trees. So now, according to these hypotheses, there were native American foxes moving south because of habitat and climate changes, plus introduced European foxes roaming around in the Southeast. Which ones do we have today? Until relatively recently, the American and European red foxes were considered different species—*Vulves fulva* and *Vulves vulves* respectively—but scientists now consider the foxes to have always been the same.

Wildlife behavior is always a challenge to understand, especially when human and natural factors combine.

Be a Good Scout

Broaden your definition of pre-season scouting and you'll increase your chances of putting venison in the freezer.

by Eddie Nickens ©1993

My friend Steve was grinning when I pulled up beside his truck. "Got something to show you," he said through the open window, turning to search through a jumble of boxes, fly reels, camera equipment and yellowed papers. "Ah, here it is."

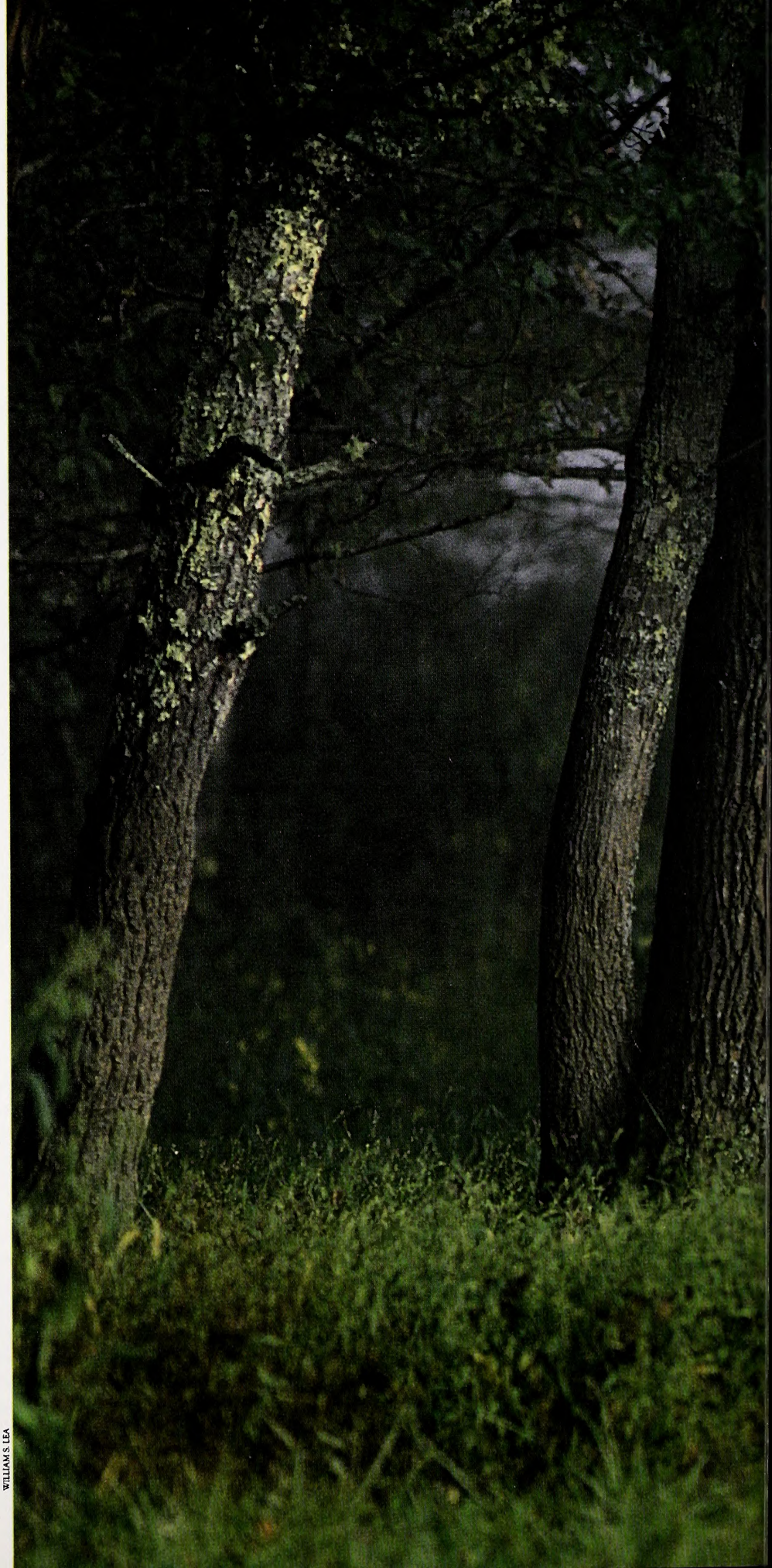
He wheeled around with a flourish. "What do you make of *this*?"

In a firm grip he held the shed antler of a mature buck. The half-rack boasted four long points, each gleaming white. The tines and main beam were well-proportioned—not especially heavy, but not the skinny branches of a yearling buck, either. What brought a gasp from my lips was the height of the back tines. They were easily a foot long.

"Where," I mumbled, vainly searching for verbs and nouns to complete my sentence. "Where did you find it?"

"Oh, down on the farm," Steve teased. "One day I might show you the spot."

"Down on the farm." These days, that's a phrase hunters are likely to say and hear with greater and greater frequency as the seasons for deer and other game species edge closer. About now, hunters start combing their favorite woodlots and field edges, searching for signs that will help them choose tree stand



***This whitetailed buck** may not feed in the same spot or use the same route to get there after hunting season opens, but many successful deer hunters are now scouting potential areas and planning their strategy virtually year-round.*

WILLIAM S. LEA

locations, deer drive routes, best bets for duck blinds and concentrations of squirrel trees. Whether you hunt public land or private, whether you go afield with gun, bow or black-powder rifle, there is little question that your success ratio can be directly linked to how many hours you spend scouting long before the season opener. If you've waited until now to start the scouting process, wait no longer. And if you've been walking your woods all year long, congratulations. You already know that luck goes by another name: hard work.

Steve and I were headed to "the farm" for an afternoon of spring scouting for deer the day he showed me the rack. Our hunting lease covers about 600 acres of managed timberlands in northern Harnett County, and to help us channel our scouting energies I'd asked Scott Osborne, the N.C. Wildlife

EDDIE NICKENS

***Steve Wilson (left)** and big-game wildlife biologist Scott Osborne check out topographic maps during a pre-season scouting trip to determine where to employ micro-management techniques that can aid deer populations or improve hunter success once the season opens.*

Resources Commission's big game coordinator, to go with us and help explain how hunters should fine-tune their scouting missions during each season of the year.

"More and more hunters are getting to be 12-month deer hunters," Osborne says, as we bounce over the farm road to the old tobacco barns that serve as our hunt club headquarters. That means they are involved in some sort of deer hunting activity year-round, whether trying to tighten the circle of holes punched in a backyard archery target or actually in the field, scouting leased land or searching for new areas to hunt. That approach to hunting, Osborne says, will no doubt pay benefits during the open season.

We park beside the tobacco barns and instinctively scan the field edges for little blurs of tan. From here we can see for hundreds of yards across the fields and to the edge of the far woods where the crowns of mature oaks bulge. One of Osborne's first suggestions is related to this varied vista.

In the first stages of scouting, he suggests, hunters should define what they want out of the hunting experience. "Be honest, and ask yourself if you want an aesthetically pleasing hunt in an oak grove, or are you primarily interested in harvesting a mature buck?" he explains. "Do you like to hunt open woods or watch a field edge? How do you feel about glassing a cutover for most of the morning? There are a lot of personal preferences about what a good hunt means, and asking those kinds of questions is the first thing I'd do to begin the scouting process."

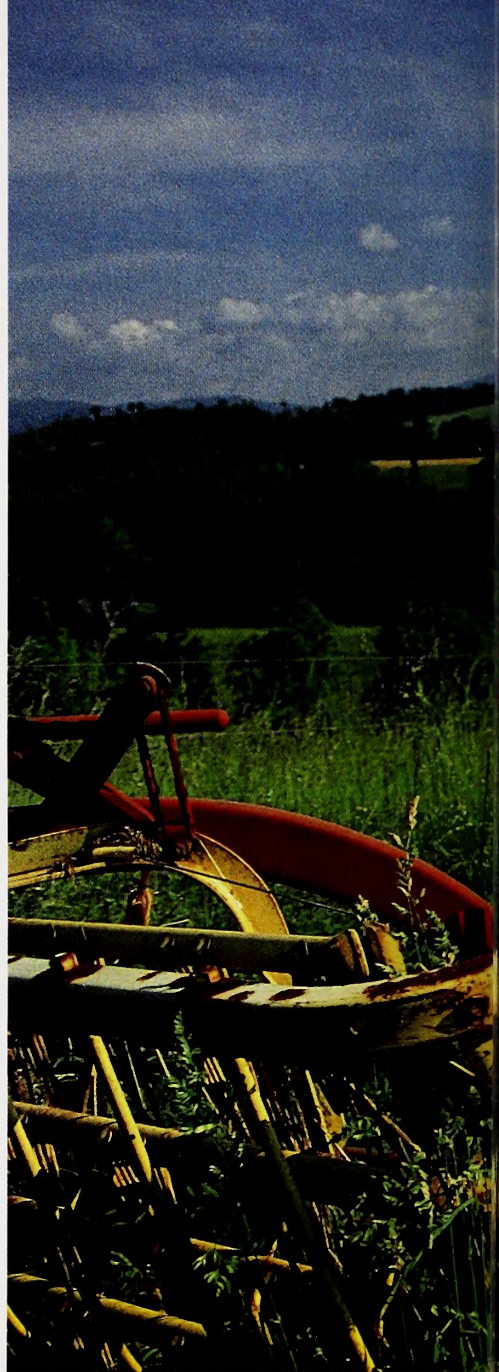
Osborne's other "first-step" suggestion is one too many hunters overlook. Early in the process of managing any piece of land for hunting and fishing, Osborne says, leaseholders or owners should think carefully about controlling access. Hunters can spend a great deal of time scouting the woods, putting in food plots and building blinds, only to have illegal hunters come in and wipe the slate clean.

"Poachers can undo in five minutes what it's taken you five years to accomplish," he says. "Too many people overlook the importance of controlling access, especially if they are hunting a smaller tract of land."

It's true. Most large clubs or landowners with 1,000-acre leases are very strict about permission slips and locked gates. But the hunter who combs a 50- or 100-acre woodlot might overlook access security until he stumbles across a poacher's calling card: a pile of deer hair in the back corner of a favorite field.

Steve and I make a note to double-check locks and gates as the three of us start down a farm road that tunnels through two pine stands. Spring growth has begun to choke the thickets and whittle away visibility in the woods, but the suffocating summer heat is still weeks away, and a bit of chill makes the walking pleasant. Such seasonal changes play a critical part in the scouting process in ways many hunters may not realize. While pre-season scouting brings to mind a hunter searching for late-summer bedding sites and old rubs, a year-round regimen of on-the-ground reconnaissance, maintenance and food plot management is the most effective way to manage any hunting grounds.

The months immediately after hunting



season present prime opportunities for walk-about scouting. Fresh rubs glint in the monochromatic woods like traffic signals, and shed antlers offer positive proof that Ol' Coat Rack made it through another season.

Many deer hunters use late winter to chase quail or catch up on much needed sleep, but it's also a perfect time to jumpstart the scouting process. On a rabbit hunt last year, Eric Misenheimer and I pushed a bunny from a thicket atop a little knoll that overlooked a year-old clearcut. While waiting for the beagles to circle I noticed a couple of nice rubs. Then I saw a few more, and soon Eric and I had tallied several dozen rubs in an area no larger than a small backyard—no doubt a core bedding area for some big buck that survived the season. It wasn't long before Eric began talking about buying a new deer rifle,

EDDIE NICKENS

Keith Gleason glasses *an expanse of fields and woodlots along the New River as part of a pre-season scouting expedition. Where he has permission to hunt, the most likely-looking areas will get more in-depth scouting prior to the season.*

WILLIAM S. LEA

Numerous droppings show *that deer are using an area. Finding such sign in the summer does not necessarily pinpoint a good hunting spot because deer adopt different travel and feeding patterns during warm weather. Such sign is more reliable when found late in the season or in early spring.*

STEVEN A. WILSON

***Larry Green found** this big antler in an area he plans to hunt, and you can bet he's hoping that pre-season scouting trips will give him clues to help locate the buck that shed it once the season opens.*

and I have a pretty good idea which tree he'll be shimmying up come October.

Chasing quail and woodcock also affords late-season scouting. Wading through cutovers during quail season last year, I found heavy concentrations of bedding sites in an area overlooked during the deer-hunting season. This was classic cutover, with visibility measured in inches. These deer don't have to move 20 feet all day long. They can bed in the clearcut, feed on the pokeberry and honeysuckle that doubles as cover or take a quick walk to the nearby field to munch on corn. That doesn't present many shooting opportunities, but I had found one of the hangouts they use during the open season, and I had six months of planning to fine-tune my ambush.

That, says Osborne, is the correct way to plan year-round scouting: taking advantage of what each season offers. By the time spring arrives, he says, deer behavior and travel routes will differ dramatically from those in the fall. Time spent patterning deer during the spring and early summer will be largely wasted. So that's a better time to concentrate on maintenance: Any work on buildings, traditional stand sites, roads and gates are best planned for April, May and early June. Then, in late summer and early fall, there will be plenty of time to spend with binoculars in hand, not a hammer.

By midsummer, on-the-ground scouting should be in full swing, and the hunter can wade into sensitive areas he wouldn't dream of disturbing in the weeks before the season opener. It is still important to think critically about the sign—trails into and out of feeding and bedding areas, droppings, sightings—left on these early forays. Remember that these are undisturbed summer deer. Hunters should fast-forward their mental calendar to a Saturday in October. Imagine a buck using a particular trail as an escape route from a hunting buddy who overslept and is making his way to the riverbottom just as there is enough shooting light. Would the buck stick to the trail or shadow it? Which direction would he take? What thickets would provide a safe haven? Where could you plan an ambush? Knowing the location of deer trails is only the first step in the scouting process.

When scouting, Osborne says, deer hunters should keep in mind two primary components: food and cover. Yet, hunters need to keep in mind that they're not looking for where deer are *now*, but where they will be in fall and

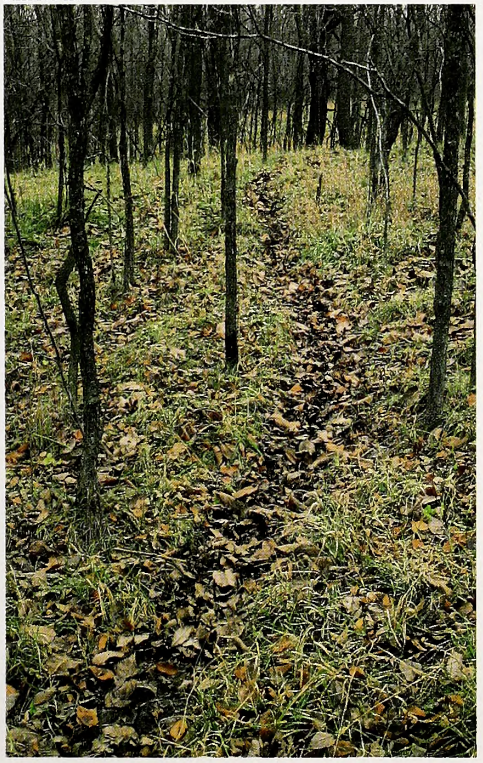
early winter. Often those are very different areas. Even so, late summer scouting will be helpful in focusing on particular agricultural fields deer are using, and it will keep hunters from showing up on Opening Day to discover that last year's cornfield was in this year's tobacco. The difference in the diet of deer at various times of year is a critical part of the scouting equation, Osborne says. Deer will likely prefer native vegetation over other forms of forage. As air temperatures drop, deer will shift to forage foods high in fats and carbohydrates, such as hard and soft mast, Osborne explains. Even in areas where deer utilize row crops such as corn and soybeans, the natural mast component becomes a critical factor. This includes hard mast (such as acorns) and soft mast (black gum and pokeberries, for example). By the time bow season opens, oak trees are the focus of intense deer activity. Late in the season, Osborne says deer will search for anything green to eat, and honeysuckle thickets may become important foraging areas, especially if the acorn crop is poor.

The deer's social structure also plays a role in deciding where and how to scout. Deer are most segregated in late summer when many hunters begin scouting. Bucks will tend to group together, and does will often form their own gender-specific communities. There will be little interaction, Osborne says, until early rutting activity breaks the late summer pattern. Therefore, bow hunters after bucks should be careful not to lend too much weight to large groups of does when pinning down September stand locations. "Don't assume that bucks will be following these late summer doe groups," Osborne warns.

And don't expect those large numbers of deer feeding in the fields to remain after you and your buddies start climbing nearby trees. Yearling bucks may frequent fields during the first few weeks of the season, but hunters have a way of culling out the inexperienced bucks, driving the survivors deep into cover.

To tip the odds in their favor, Osborne says, hunters should consider "micromanagement" of their favorite hunting areas as part of the overall scouting scheme. He explains further as we stop at the intersection of a firebreak and the farm road. "Now, consider this very spot," he says noting the lay of the land. The road is a long straightaway tunneling through the woods, with overhanging brush that limits visibility. A firebreak between two stands of pine—one young and thick, the other more mature and open—cuts through a small clearing in front of us, then juts off the road at a 90-degree angle. "You could have a terrific deer stand right here," Osborne says. All we have to do, he explains, is open up the visibility down the road, prune away a long shooting lane down the firebreak, "daylight" the small clearing with chainsaws and bush-

WILLIAM S. LEA



WILLIAM S. LEA

***Rubs where bucks** have polished their antlers and left visible warnings against rival bucks (above) are a fairly reliable indication that an area has potential. Well-used deer trails (left) are enticing to hunters, but they can be misleading, especially since many may be used mostly during the summer months.*

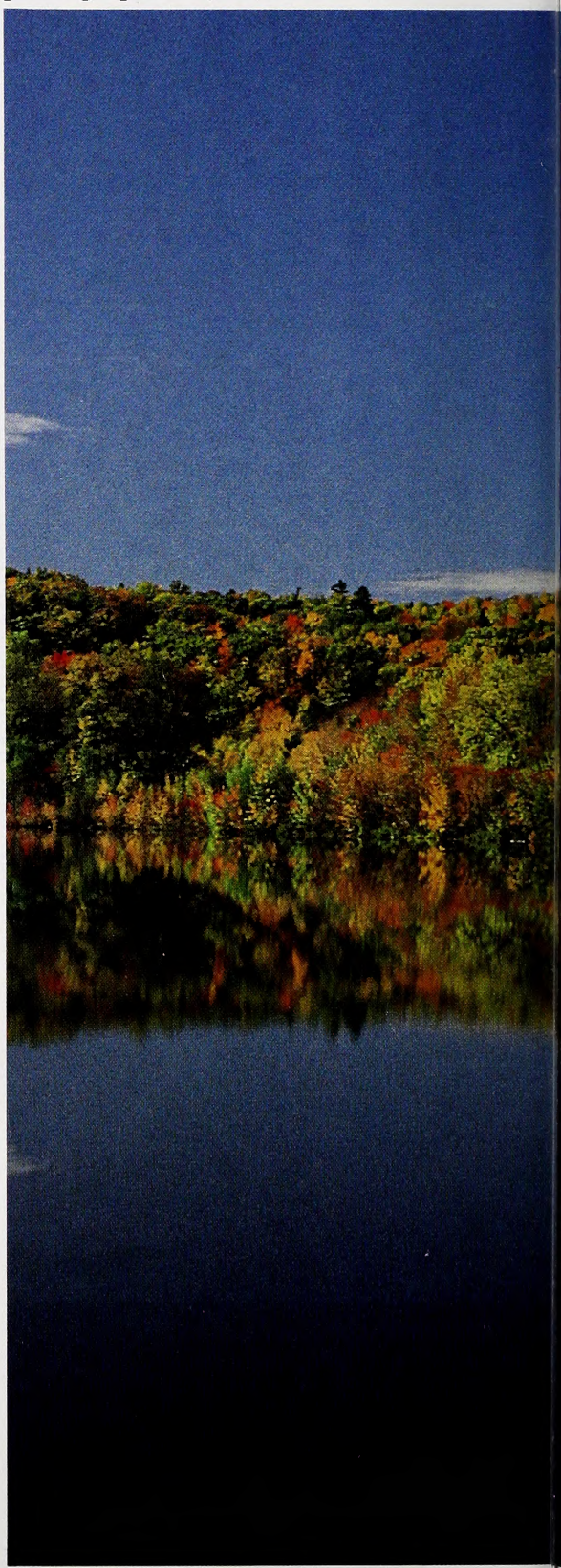
axes, and possibly till up a small food plot. With a carefully built tree stand, a gunner could watch the road for 75 yards in either direction, keep an eye on the firebreak and open pines, and hope that a hungry buck stops by the food plot on his way back to his bedding area.

That's a lot more involved than the traditional ways of scouting, but as more and more hunters turn to long-term hunting leases, preseason scouting increasingly means managing land with bush axe or posthole digger in addition to map and compass. It's all a part of the trend toward redefining the hunt to include year-round activity. And it's all as much a part of hunting as pulling the trigger. ☒

MIRROR IMAGES

photographed by William S. Lea ©1993

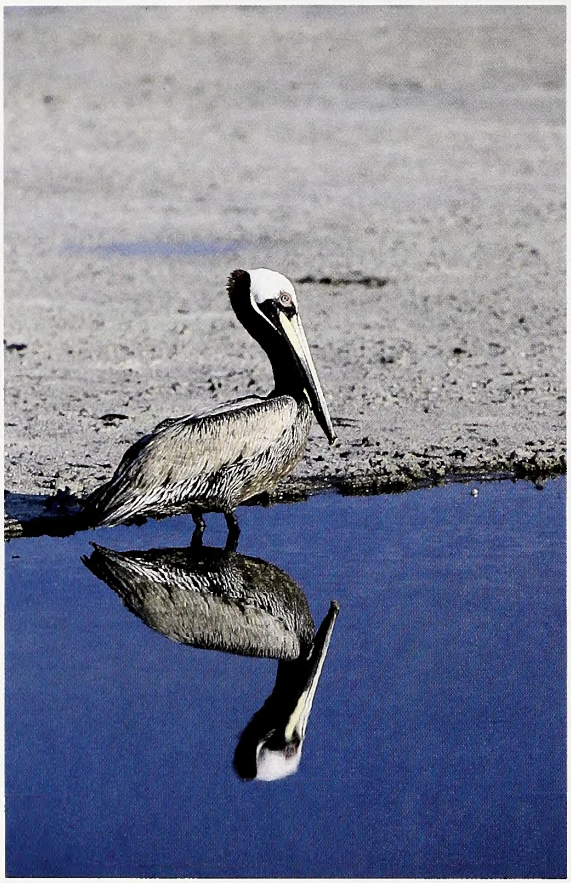
On a falling breeze the lake grows smooth as burnished brass. The season's spangled colors are multiplied on the still surface and even a whitetail buck finds his double there.



MIRROR IMAGES

Still waters yield wavering images—the doe interrupted in her delicate passage across the stream, the trees swaying in their haunted swamp domain.

MIRROR IMAGES



In the Greek myth, Narcissus stared at his reflection so often the gods changed him into a poolside flower, but these animals are unaware they carry a reverse image, like a shadow, beneath them.

North Carolina Hunting Seasons 1993-94

Species	Hunting Season	Daily Limit	Possession	Season
Crow	Thurs., Fri., Sat. of each week from July 1 to Feb. 28 and Thurs., Fri., Sat. of each week from June 1 to June 30 plus Labor Day and Christmas Day		No restriction	
Dove	Sept. 4-Oct. 2 (12 noon - sunset each day) Nov. 22-Nov. 27 (all day)* Dec. 13-Jan. 15 (all day)* *Shooting hours are from one-half hour before sunrise until sunset during Nov. 22-27 & Dec. 13-Jan 15 seasons.	12	24	None
Rails, Moorhens and Gallinules				
Moorhens and Gallinules	Sept. 4-Nov. 12	15	30	None
Clapper Rail, King Rail	Sept. 4-Nov. 12	15	30	None
Sora Rail, Virginia Rail	Sept. 4-Nov. 12	25	25	None
Deer		2	*5	*5
Bow and Arrow	Sept. 13-Oct. 9 (**Eastern) Sept. 13-Oct. 9 and Oct. 18-Nov. 20 (**Western) Sept. 13-Nov. 6 (**Central) Sept. 13-Nov. 13 (Northwestern)			
Muzzleloading	Oct. 11-Oct. 16 (**Eastern) Oct. 11-Oct. 16 (Western) Nov. 8-Nov. 13 (**Central) Nov. 15-Nov. 20 (Northwestern)			
Gun	Oct. 18-Jan. 1 (**Eastern) Nov. 22-Dec. 11 (**Western) Nov. 15-Jan. 1 (**Central) Nov. 22-Dec. 11 (**Northwestern)			
Gun Either Sex and Special Either Sex	See *1993-94 North Carolina Inland Fishing, Hunting and Trapping Regulations Digest*			
Black Bear	See *Regulations Digest*	1	1	1

Wild Boar	Oct. 18-Nov. 20 and Dec. 13-Jan. 1	1	1	2
Gray Squirrel	Oct. 18-Jan. 31	***8	16	75
Fox Squirrel	Oct. 18-Dec. 31 (Only in 18 counties. Season closed elsewhere. See *Regulations Digest*)	***1	2	10
Common Snipe	Nov. 15-Feb. 28	8	16	None
Quail	Nov. 20-Feb. 28	10	20	None
Ruffed Grouse	Oct. 18-Feb. 28	3	6	30
Raccoon and Opossum	****Oct. 18 (sunrise)-Jan. 31 ****Oct. 25 (sunrise)-Feb. 28	No restriction on opossum. See *Regulations Digest* for bag limits on raccoon.		
Rabbit Rabbit—Box Trapping	Nov. 20-Feb. 28 Nov. 20-Feb. 28	5	10	75
Pheasant—Nonnative Male Pheasant Only	Nov. 20-Feb. 1	3	6	30
Woodcock	Dec. 9-Jan. 22	3	6	None
Bobcat	****Dec. 13-Jan. 31 ****Dec. 13-Feb. 12	No restriction		
Fox	See *Regulations Digest*			
Groundhog	No closed season or bag limits.			
Coyote	No closed season or bag limits.			
Wild Turkey Bearded Turkey Only	****April 9-May 7	1	2	2
Resident Canada Geese	Sept. 16-Sept. 30 (west of I-95 only, permit required)	3	6	None
Migratory Waterfowl	Unavailable at this time; Federal regulations may be obtained by contacting license agent or writing N.C. Wildlife Resources Commission after October 1, 1993.			

*One of which must be antlerless, Bonus Tag valid in some areas, see *Regulations Digest*.

** See *1993-94 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest* for approximate boundaries of Eastern, Central, Northwestern and Western deer seasons. For a copy of the *Digest*, write: N.C. Wildlife Resources Commission, 512 N. Salisbury Street, Raleigh, N.C. 27604-1188.

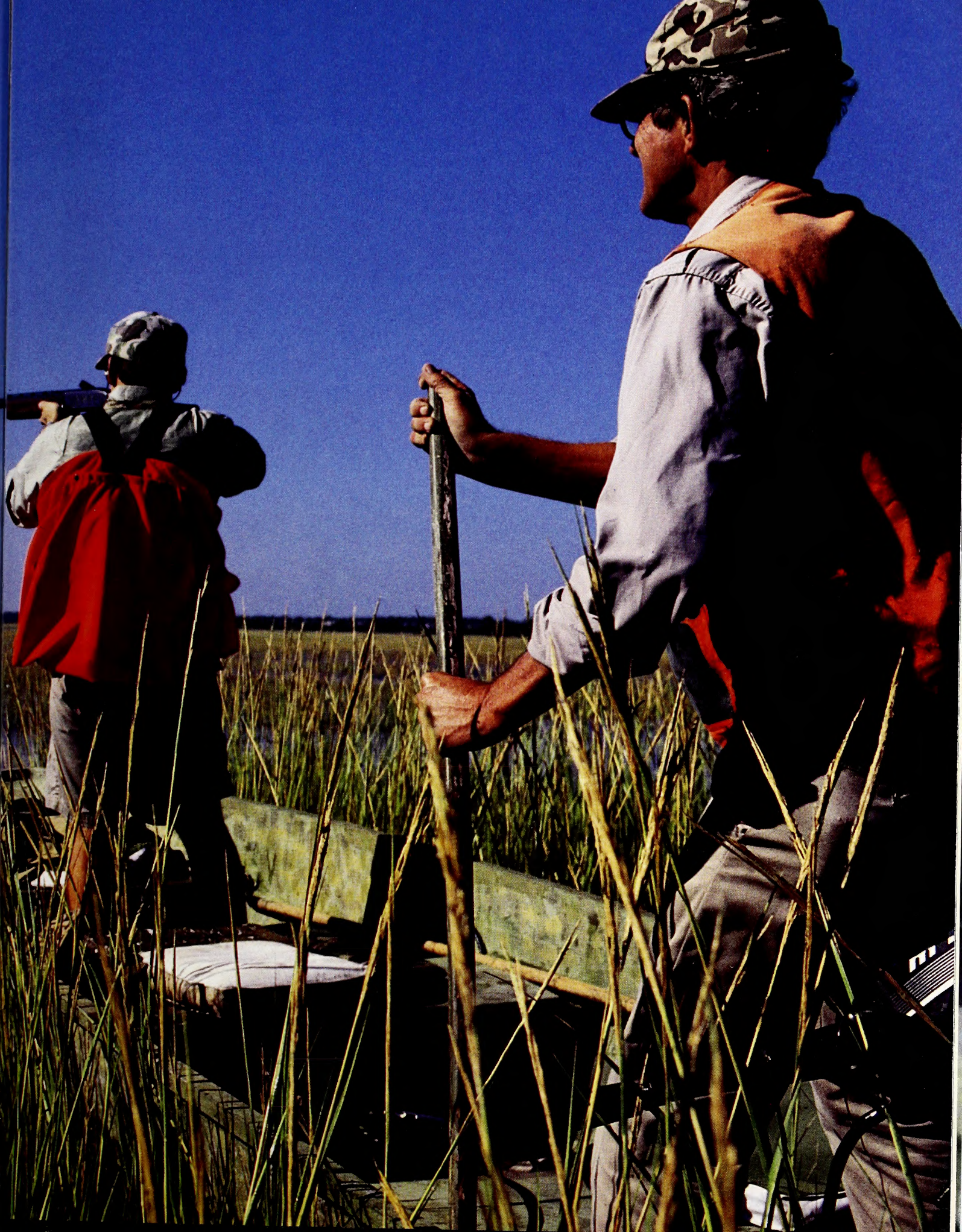
*** Total limit of 8 squirrels per day of which one can be a fox squirrel.

**** Season varies by county; see *1993-94 Regulations Digest*.

Mad About Marsh Hens

Ever wonder why almost no one hunts marsh hens anymore? Here's someone who does, but you may well wonder why.

written and photographed by Vic Venters



***This gunner takes aim** at a clapper rail that has just flushed. On days like this, when water is low in the marsh, the birds prefer to run or swim rather than fly, and hunting can be difficult, to say the least. In these conditions, the birds can sometimes be flushed by wading.*

Interested in marsh hen hunting, are you? Good, I need a hunting partner.

You know the best thing about hunting marsh hens? I didn't think so. I'll tell you. It's how much it improves your wingshooting skills.

Take my friend Loran in Wilmington. Now don't get me wrong, I've seen him do wonders with a deer rifle at 200 yards. But with a shotgun? Let's just say the pah'tridge don't quake when he pulls his Remington from the gun case. On the dove field he usually drops more curse words than birds. But the last time we went out for marsh hens—or for clapper rails, to use their proper name—he copped a pretty fair imitation of Annie Oakley, bagging eight or nine hens in about as many shots. I was shocked, even impressed. I didn't do too badly myself, taking a triple, quite a rarity in my wingshooting repertoire.

"Wait 'til I get in the dove field," Loran told me after dropping another outgoing rail one day two Septembers ago. There was uncommon confidence in his voice as he spoke those words.

"What about Opening Day?" I reminded him. "The doves weren't exactly falling like leaves."

"Yeah, but that was then," he said.

"No, that was just last week."

"But I'm ready for 'em now," he replied. "My shooting eye is honed up."

I had news for him: better keep the whetstone out. On our next trip to the corn stubble after doves, his new-found shooting skills evaporated fast under a hot September sun. And you know the saddest part? I didn't shoot any better. We pushed a lot of lead to sky, bringing but few doves to earth. Back to proper form, in other words.

So let me rephrase my original comment—the best thing about hunting marsh hens is how much it *appears* to improve your wingshooting. I'll put it another way: the marsh hen flies less than fast. If it were an airplane it would be a DC-3 with one engine shot out. Its flight is low, slow and lumbering. Straight away, too. Miss more than one or two shots at a marsh hen and you can expect to hear some snickers.

Sound exciting?

Great, come along then. We'll walk down to the boat. But there are a few things I need to tell you about before we go—the pros *and* the cons of rail hunting. Yes, there *are* many attractions, Take a guess at one.

The beauty of the bird?

Sir, where are your glasses? Gangly of limb and skinny, the clapper rail—and not a set of railroad tracks—gave rise to the saying "thin as a rail." Toss in the long beak and those ungainly, stilt-like legs, and you can scratch it out of the elegance category. Plumage? Its colors are brown and gray, typical of many a gamebird, but utterly lacking in the understated elegance of a gray partridge, a woodcock, or even, heaven knows, a snipe. I would be veering into politically incorrect territory to call the rail "ugly." Let's just say it will not make a pheasant jealous.

How do we do hunt them? Well, on the Atlantic Coast, we hunt clapper rails most often by poling flat-bottomed boats through the spartina grass, using the boat as, say, a 14-foot floating flushing dog. When the wind and tides converge to give you high water, the shooting part can be embarrassingly easy. If you hit the tides right, there's not much bird hunting any finer.

But now to the cons.

What? You don't want to hear them? You're ready to go? You're sure? Positive? Absolutely positive? All right then, here's the boat. Have a seat. We'll need to wait until the tide is very high, with only a few inches of spartina grass above water level. Then we'll, er, you'll be able to pole this light, flat-bottomed boat across the flooded marsh, pushing up birds ahead of us.

Yes, this is the boat we're using. It doesn't look light to you? Why, it doesn't weigh more than 200 pounds empty. Don't worry, it's made out of fiberglass. When was it built? In

the early 1960s. You're right, fiberglass technology *has* come a long way since then. But it could be worse—it could be wood.

By the way, how strong is your back?

It is? Super, we'll be best friends. Two hours to peak high tide. Time to go. Step on in the boat. No, no, no, I'm the guide, so *I* sit up front, you get in the stern. Just grab this pole and push. That's it. Again, you need to build up some steam. I can't help that the wind's in your face. At least its not blowing 20 knots. Why, yes, the mud is always this soft. I'll consider trading positions after, uh, I get my limit.

Perchance, do you enjoy reading Homer, Cicero, Tacitus, any of those guys? Never heard of them? Shame, you redneck scoundrel! Then consider this an exercise in classical education—Roman-galley style.

Uh-huh ... what about Spartacus? Actually, you've done quite well, my friend. My arms usually give out after half hour, especially when the water is this low. No, you can't run the motor, that's illegal while hunting. If you'd like to get out and wade that's fine. Some people do it. But I think you'll find it's harder walking through that gunk than pushing. So be a smart chap and give us another push. It's no more than 2 miles. Blisters? You should have brought some gloves.

You're right, it's not hard to love those generous bag limits. In North Carolina, bag limits for clappers are 15 birds per day. This doesn't include sora and Virgina rails, of which you can add another 25 birds per day. That's potentially 40 birds per day per person, if you're the bean-counter type. Seasons are also long, generally beginning in early September and lasting through early November. That's a lot of potential shooting.

So why aren't we flushing them? As I said, there is this matter of tides. And wind. And convergence. And luck—of which you apparently haven't brought us much. I tried to tell....

Okay, I'll check the tide tables again. Hmmm. Yep, it says we've got a marsh hen tide—when the sun and moon are aligned. And the wind was supposed to be out of the northeast. That pushes plenty of water in the sounds. Should be perfect.

Look at the way the wind's blowing, though. It's turned against us. Blowing out of the south. That's pushing water out of the sound, counteracting the tide. That's why there's so much marsh grass still above water. It's going to be tough.

What are we gonna do? You're just going to have to push a little harder, that all. Stop complaining; you said your back was strong before we started. What *about* nitroglycerin? What good will that do? Oh, I see. Here, have a soda instead.

Listen! Hear that cackling sound? No, it's

Clapper Rail Habits and Habitat

The clapper rail (*Rallus longirostris*) is one of six rail species encountered in North Carolina marshes. These include the Virginia, sora, yellow, black and king rails. Unlike the king rail, a close cousin most commonly found in freshwater marshes, the clapper rail is found almost solely in coastal salt or brackish marshes.

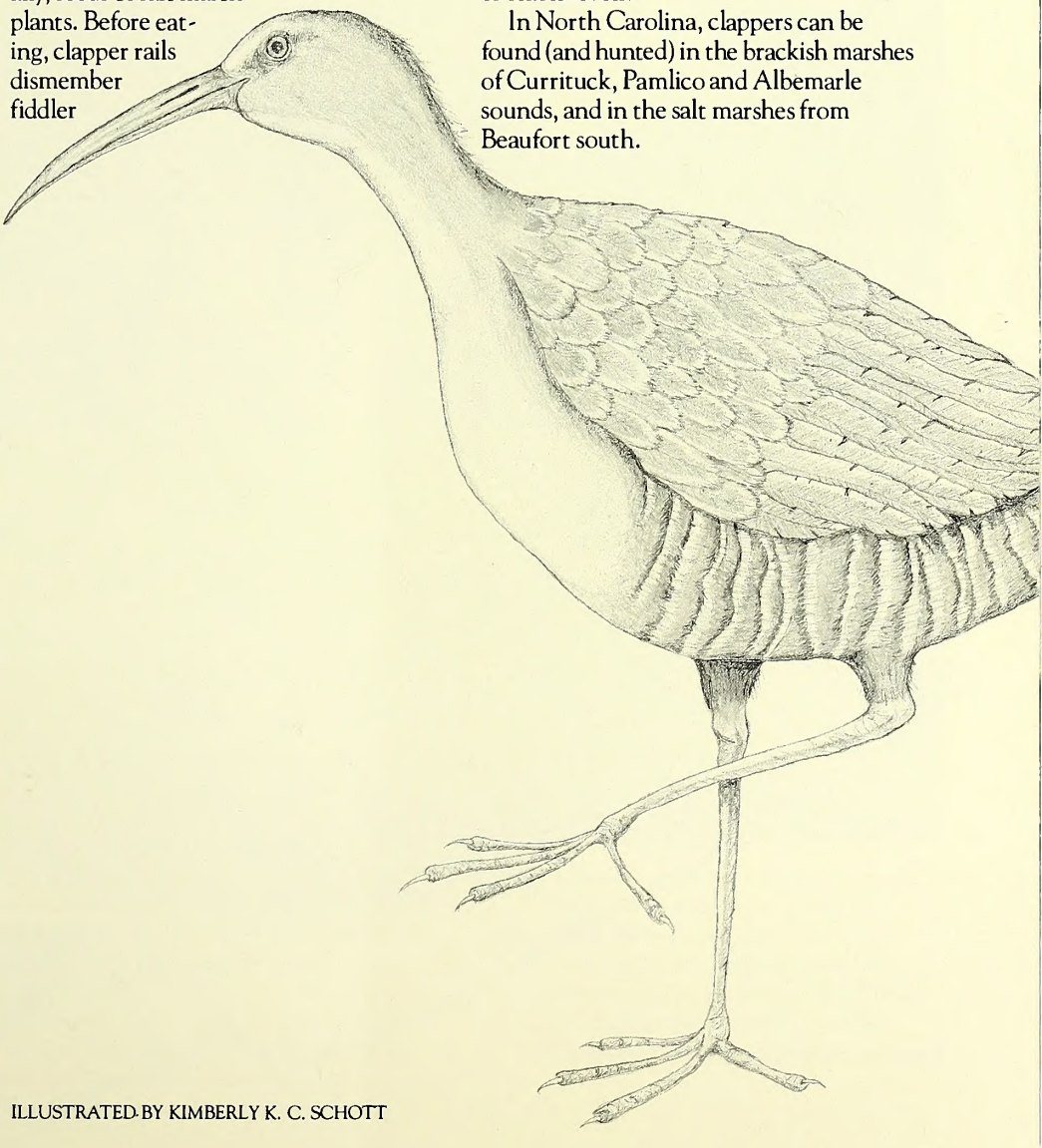
Populations in North Carolina consist of locally breeding resident birds and, in the fall, migrants from northern states. The birds have a relatively thin plumage and migrants arrive in September. Despite being poor flyers upon flushing, clapper rails are strong on the wing once they get their speed up, as evidenced by their long-distance migration.

Clapper rails breed extensively in May and June and both sexes help tend the nest and incubate eggs. They feed mainly on fiddler crabs, periwinkle snails, grasshoppers, other insects, marine worms and, occasionally, seeds of salt marsh plants. Before eating, clapper rails dismember fiddler crabs by biting the crab at the joint between shell and claw, then shaking it, like a dog savages a rodent, declawing the crab for easy eating.

Rails have an astounding vocabulary of various calls, clacks, shrieks and groans, often expressed as *kak-kak-kaks*, *caw-caw-caws*, *bup-bup-bups* or any other number of similar sounding variations. The calls are used for mating, advertising, alarm and territorial purposes. Although some biologists dispute it, many seasoned marsh watchers believe marsh hens call out as the tides change.

Populations of clapper rails remain abundant in North Carolina. At the turn of the century, unregulated hunting and egg collection caused serious declines in populations. However, modern game regulations, very light hunting pressure, and the existence of large amounts of undisturbed habitat have restored populations to stable levels.

In North Carolina, clappers can be found (and hunted) in the brackish marshes of Currituck, Pamlico and Albemarle sounds, and in the salt marshes from Beaufort south.



ILLUSTRATED BY KIMBERLY K. C. SCHOTT

You're Going to Eat What?

One of my first culinary lessons in clapper rail cookery was finding out just how good a bad-smelling bird can taste. Rails aren't called marsh hens or mud hens for no reason; they live in the marsh mud year-round. Toss a rail in the bottom of the boat and give him a couple hours in the sun and he'll soon start smelling like one of those slabs of French cheese that I can't pronounce. But never fear, ugliness—in this case, stinkiness—is only skin deep.

Assuming you do hit the tide right, you should get plenty of birds. It's best to keep your birds chilled in a cooler and dress them as soon as possible. Always skin your birds because that's where the muddy odors concentrate. After skinning, what you'll find is a bird fair of flesh—between a dove and a quail in darkness and taste. Very fine.

Pat Allen, a stockbroker in Wilmington, is one of the few true expert marsh hen hunters I know. He grew up on the marshes of the lower Cape Fear and has 40 years experience chasing these birds. His recipe is simple and traditional, but delicious.

Pat's Pan-Fried Rail in Giblet Gravy

INGREDIENTS:

1 large well-seasoned (blackened) cast iron skillet with lid. (Warning: do not try this recipe with European cookware or anything Teflon. A seasoned iron fry skillet is essential, your grandma's is preferable.)
4-6 *young* marsh hens
1 cup of flour
1 pound of bacon, fried, and reserve the grease
1 large onion, finely diced
Bay leaves, onions, salt and pepper, dash of Worcestershire sauce, various spices to taste (a little sherry and garlic are okay if desired but in excess verges on foppery).

Separate young birds from older birds. Young birds generally are smaller, lack full plumage, and have lighter gray colored legs. Young birds are tender and should be cooked together.

Skin and clean birds by splitting down the back with poultry shears. Breasts are thin and legs have the most meat. Save neck, gizzards, livers and heart.

Clean, skin and mince gizzards, adding them with necks and hearts to a pan of water. Season with spices to taste, bring to boil and simmer 30 minutes or so. Scrape meat from neckbones and mince giblets when tender.

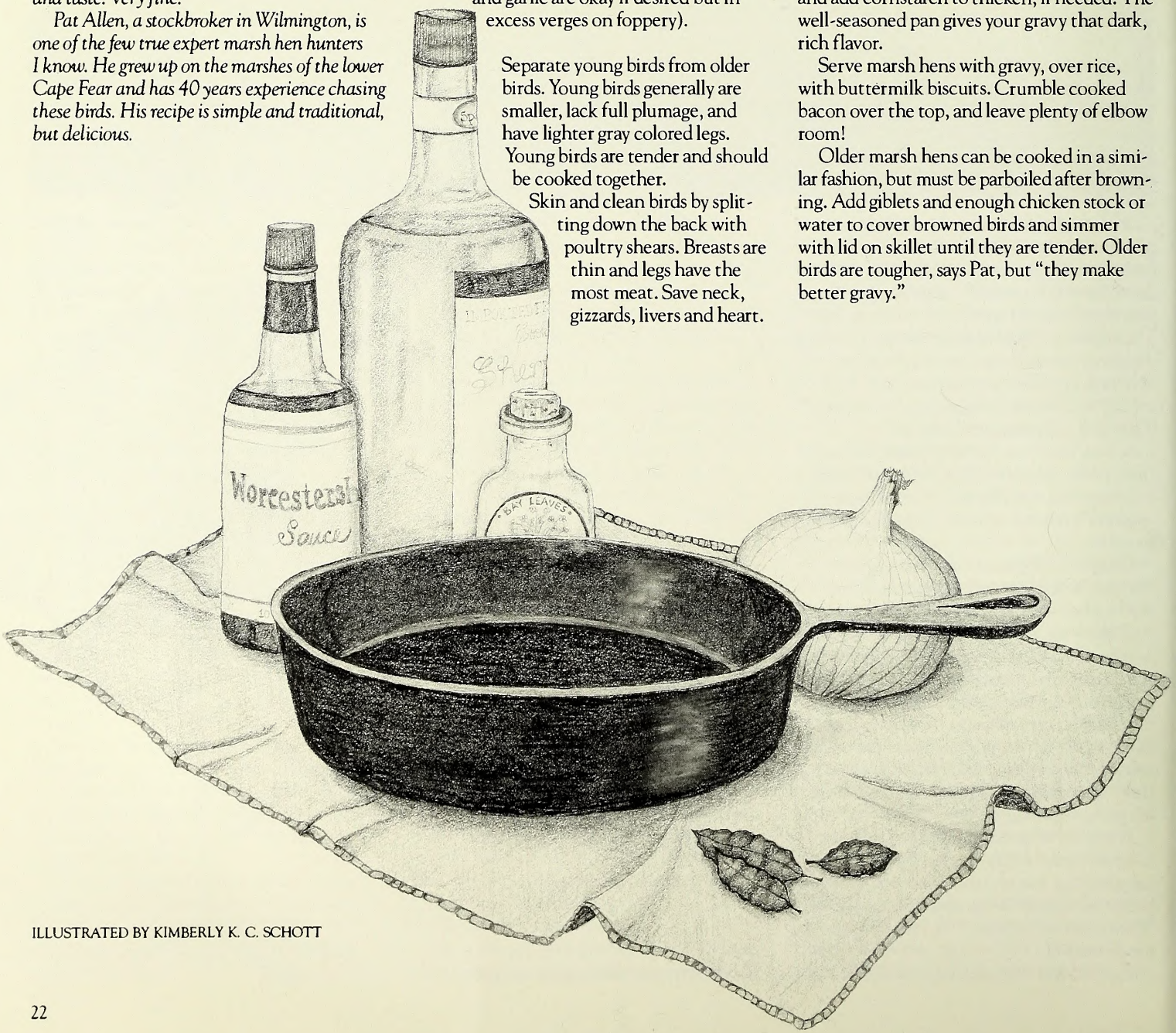
In the meantime, brown onions in bacon grease. Remove onion and add to giblet sauce.

Lightly flour birds inside and out, adding salt and pepper as desired. Butterfly birds to open chest cavity. Brown in bacon fat in skillet over medium/low heat, turning birds often to prevent burning. Marsh hens have little fat, so don't overcook. When done, meat should be firm, but not dry inside.

Remove marsh hens to a warm plate. Pour off most of the bacon grease and add giblets and liquid to skillet. Reduce liquid to gravy and add cornstarch to thicken, if needed. The well-seasoned pan gives your gravy that dark, rich flavor.

Serve marsh hens with gravy, over rice, with buttermilk biscuits. Crumble cooked bacon over the top, and leave plenty of elbow room!

Older marsh hens can be cooked in a similar fashion, but must be parboiled after browning. Add giblets and enough chicken stock or water to cover browned birds and simmer with lid on skillet until they are tender. Older birds are tougher, says Pat, but "they make better gravy."



ILLUSTRATED BY KIMBERLY K. C. SCHOTT

not a monkey, it's a marsh hen calling. Yes, they're all over the place, we just can't see them. Everywhere. Yes, it does sound like laughing. At whom?

Whom do you think?

No, I only said it was easy when the tide is high enough. Enough today is not tide enough. How often do I get here when the water levels are right? About one in four times. Marsh hens fly only when they have to, when there's so little grass above water that they can't hide. Otherwise they skulk around the grass or dive under water in front of you. Keep pushing, though, maybe we'll get lucky and scare one up.

Look! There's one. He's running in front of us. See him, darting through the grass. Into the breach, good sir, put your back in it!

Uppp. He just dove under water. Hmmm. Lost him.

On the water? Wouldn't be prudent. Listen, I said marsh hen shooting was easy, but I'm not going to make it that easy. Keep your cool.

Say . . . . nice gun you've got here. May I shoot it? Splendid. It's your grandad's Parker! Goodness gracious, is he still alive? Well, it's probably best that way. Hey, watch that pole; you've just dropped a gob of mud down the action. Let me have that rag, I'll wipe it off. Thanks. Hey, is this the one that's been sitting in the bottom of the boat?

You know, I think the craftsmanship on these old guns may have been overrated. Look here, the barrels are already turning brown. I'm sorry about the leather gun case, too. If you rinse it enough, the salt should come out.

Hey, we're coming up on a tall clump of marsh grass. Be sure to breath in deep and close your mouth before we hit the grass. Otherwise the bugs will fly in your teeth. They'll swarm all over us, too.

Yikes! You forgot your bug repellent? Sorry, I'm out now. I've got some toothpicks though. Here, have one.

Huh? What do you *mean* you want to turn back? Oh come on, don't be a sissy. Pick up that pole and be a good sport. I'll even let you shoot. Come on, come on, get back in the boat.

All right, maybe we should go. The tide's started to fall, so I'll motor us back. You know, I didn't realize you'd pushed us in here so far. Marina must be 3 miles away. We need to get out of this marsh fast before we get stranded by falling water. Let me tell you, it's not a lot of fun to be stuck in the mud 12 hours when you don't have any bug dope or sunscreen.

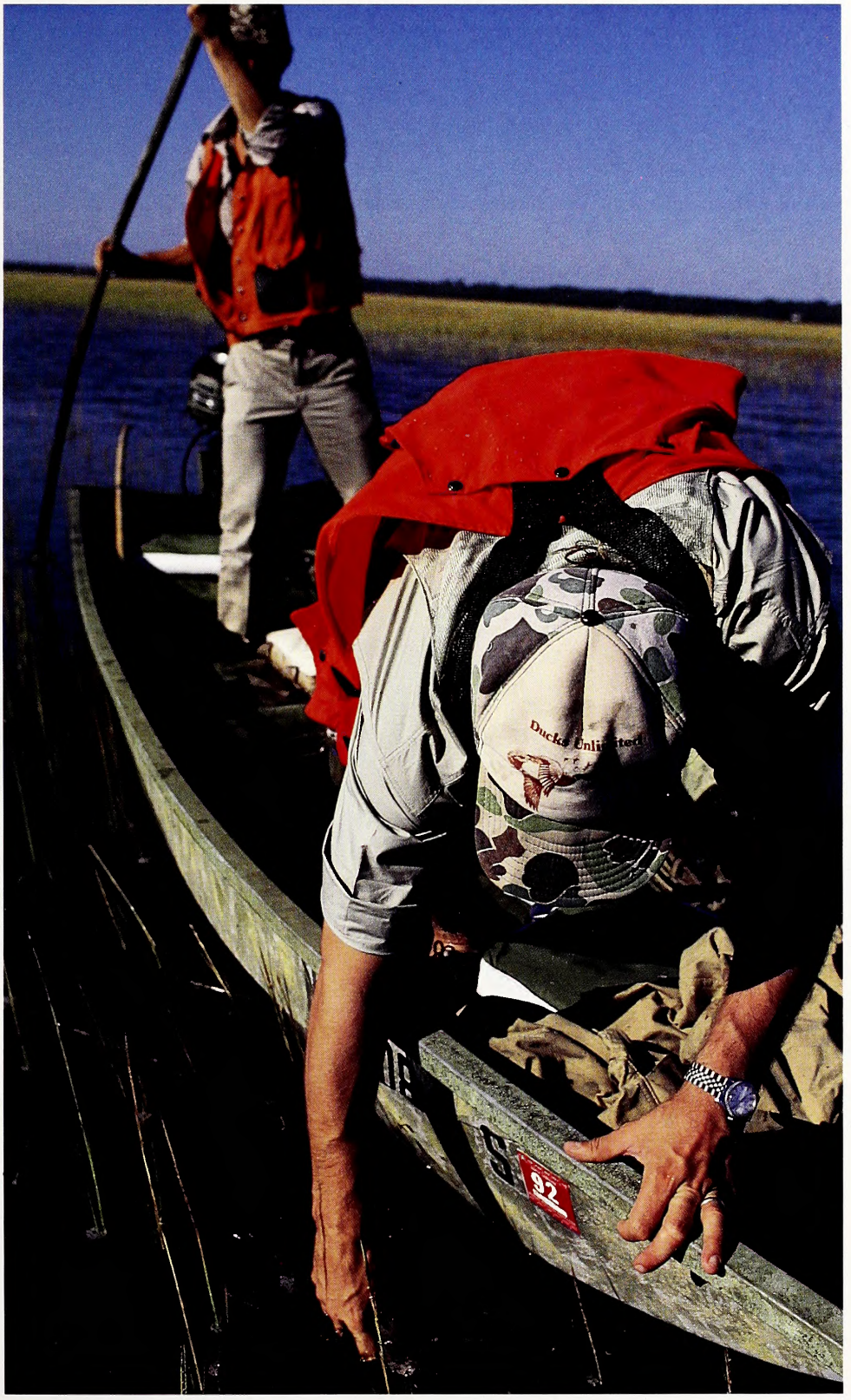
I'll unload your Parker first. Stubborn old bugger. Here, you take it. See if *you* can get it open. I've got a pipe wrench in the tool box.

Well at least the motor starts. We're under way. Now this is nice isn't it—a fine September sun, a cool breeze, salt in your mouth and the Atlantic roaring in your ear. Look at all those blackbirds, herons and egrets. Beautiful, huh? Who needs to shoot a marsh hen to have fun. Well, you're right, sailing would have been easier.

Cruuump!

Whoa! What was that? Must have hit an oyster bar. Let me pull the motor up.

Say, buddy, you got an extra shear pin? ⊡



***A hunter retrieves** a marsh hen from a salt marsh in the lower Cape Fear. When the tide and moon converge to bring high water to the marsh, the shooting can be excellent. Clapper rails are abundant in North Carolina's coastal marshes.*

the AUTUMN ANGLER

Fall fishing is prime in the streams, shallow lakes and impoundments of the Coastal Plain. Best of all, you'll most likely have it to yourself.

written and photographed by Gene Hester

I got my introduction to fall fishing by going deer hunting. Jack Dermid and I sat in a boat in a small creek talking to a deer hunter. The hunter, on a midday break, was on the porch of his hunting camp. As Jack asked him about deer and deer hunting, my eyes were locked on a beautiful chain pickerel lying on the porch.

This little one-room shack wasn't your typical deer camp. It was built in the swamp beside the creek, so close to the creek, in fact, that the porch actually extended over the edge of the water. It had been designed to double as a porch and a boat dock.

That pickerel, better than 20 inches, was a beauty. It was dark, almost black, and still wet and flopping.

"Where'd you get that jackfish?" I asked.

"Caught him right over there," said the hunter as he pointed upstream to the middle of the creek. "I was fishing from right here on this porch." I noticed his rod leaning against the cabin with a red and white Dardevle spoon at its tip. "Yesterday I caught two bigger than that one, all from the same spot," he said.

Frankly, I don't remember a single word of the conversation about deer hunting, but every detail of that fish has remained in my memory as vivid as it was that day 20 years ago. That day marked a turning point for me. I had always believed that the end of summer meant the end of the fishing season, and my equipment collected dust until spring, but one jackfish changed all that. Since that day, I have tossed a lot of lures and caught my share of really nice fish in the fall. In fact, the fishing can be as good as springtime fishing. The tactics I use and recommend are tailored for the shallow lakes, impoundments and rivers of the Coastal Plain, though some will work well elsewhere.

Fishing in autumn is different from spring fishing. The weather and water are different, and habits of the fish are, too. For one thing, most fish are not spawning. Since they are thinking more about food than sex, this gives them a more favorable inclination to go after a lure. My tackle box holds a lot of lures that might be potentially enticing as food, but I have not yet found one that offers much in the way of sex.

Autumn weather is often variable—hot or cold, calm or windy, sunny or raining—and the weather can rapidly change from one day to the next. Over the years we have found that we can catch fish in almost any weather, but our techniques often have to undergo drastic changes to match the weather conditions and the moods of the fish.

On a clear, balmy Indian summer day, warm-weather techniques work great. Surface lures like a Devil's Horse, Hula Popper, Jitterbug or Dying Flutter are all good bets. Sometimes, a spinner bait works great, too, if the weather is still warm. My brother William believes that you can get bass on surface lures as long as mosquitoes are still out.

On a trip when we had warm weather in October, William gave us a memorable

***Big chain pickerel** are one of fall's bonus species, especially since they often begin to feed more actively as the water cools. These fish are particularly common in the blackwater rivers, millponds and natural lakes of the Coastal Plain.*

MARK 1

demonstration. He slowly worked a Hula Popper across the surface with gurgling, bubbling noises that drove bass crazy. They hit it with a vengeance, and even chain pickerel, which usually prefer to ambush creatures below the surface, came after this surface lure.

William worked his lure slowly over submerged weed beds. We watched as we were surprised to see how often we could detect fish following the lure. The fish would create a slight, but noticeable, wake as it swam to overtake the lure. Sometimes they would swim straight to it and take it in one continuous move. At other times, a bass would swim to the lure at top speed, then circle tightly under the lure, causing the water to bulge. If that doesn't cause your heart to pound a few extra beats, I don't know what does.

"Watch this one!" William would call out as a bass approached. He'd leave the lure perfectly still as the bass swam underneath it, 6 inches and a moment away from an explosive strike. Then he'd twitch the lure, nothing more. Then, twitch it again. It seemed to drive the bass wild, and they attacked with determination.

On cloudy days the bass will sometimes keep coming to the surface all day, not just at dawn or dusk. A light rain can also sometimes make a good day even better. When the rain starts we don't head for the boat dock; we just pull a hooded rain jacket over our waders and keep fishing. Last fall, two of us caught a dozen nice bass in the rain. In fact, the best of it occurred at midday. I was surprised because the lure motion and noise were muffled by the rain, but that didn't slow up the bass. Indeed, they became more aggressive than when the water had been calm.

When the weather cools and bass are more hesitant to come to the surface, we have found that a floating-diving Rebel or Rapala can be just the right solution. These are actually great multipurpose lures. Though they are designed to run shallow and wobble, they can also be worked as an erratic surface lure. If you twitch the lure as it rests on the surface, it flashes as it darts from side to side. By combining a short retrieve with a quick rod-tip jerk, we can make it take a noisy 3-inch dive and quickly pop back to the surface. This causes a lot of action, with flash and waves, and bass seem to love it.

Last season when we found fish following, but not striking, our noisy surface lures, we used a floating-diving 3/8-ounce chrome and

***This fat largemouth** puts on a show for William Hester who hooked it on a Devil's Horse. In the generally shallow waters of the eastern part of the state, topwater or shallow-diving lures are good bets for bass in the fall.*

black Rebel. We'd crank the lure down to about 3 feet, then stop it every 6 feet while retrieving and add a couple of twitches. The lure would make a sassy little dance while suspended. If a bass was eye-balling it and trying to make a decision, that little dance was usually enough to persuade it.

"Bass see a lot of lures, and they watch most of them go by," my fishing companion Bill Hinnant says. "You have to do something to make them think this one is different. Make it dance. Dance it right in its face. A bass can't resist that." Bill's comments are based on a lot of experience and success because he has taken some really nice bass this way.

Floating-diving lures will get fish at whatever level they want to feed. If they are feeding on top, we work the lure there. If not, we pull it down a few feet and catch fish there. There are diving lures that run much deeper, too, and they're often good choices. Because of this versatility, these diving crankbaits are dual-purpose lures. In addition, they work not only for bass, but also chain pickerel, striped bass and other species, too.

When the weather cools off, we have found that a plastic worm rigged weedless and without weight can be deadly, especially if you work it very slowly. These worms are especially good fished across and through weed beds. As it slips through the weeds, the worm twists, turns, climbs and drops, which really makes it seem alive. In cold water, moving it at a snail's pace works best—just enough to prove it's alive, yet slow enough to give bass time to decide to eat it. It takes a lot of patience. The colder the water, the slower the lure should move. Bass just don't move very quickly in cold water.

Weeds usually grow in the clear, shallow waters we fish in the East, and bass find this an ideal place to feed and hide. Wading is a great way to fish weedbeds in water 2- to 3-feet deep with a moderately firm bottom. If there are many drop-offs, we sometimes use a belly boat.

Where the bottom is firm and relatively free of weeds, a jig-and-pig combination is one of our favorites. It works especially well when the lake bottom is rocky, and even better when there are underwater creek channels or other drop-offs. Every fall, we get some really nice bass from such places.

We catch most of our bass in shallow water in the fall, but a cold front will often push them deeper. This variable can increase the difficulty of finding the bass. Our approach to that, though, is to start in shallow water and work out to deeper water. In late fall, bass hold in the shallow water longer than most fishermen believe, and we always start our search there. Only after we are convinced that they've left do we move to deeper water.

Chain pickerel are a fall bonus, and they become a lot more active as the weather cools. And they stay active through the winter. We often find them in swampy places with lots of logs and weeds. In openings free of vegetation we use a Mepps minnow, jig, Dardevle, spoon, imitation crawfish, Rebel or Rapala. Color and flash are important, especially since pickerel like to eat other fish. In thicker vegetation we go to weedless lures like a Johnson spoon and pork rind or a Texas-rigged plastic worm.

In autumn, we don't wait for specific weather or a certain date—we go whenever we can. Still, over the years, we have found that when the leaves of red maples are first turning color, that's a good time to get started. It's a time of transition from summer to winter, and the fish seem to know and like it.

An added advantage is that most fishermen will have given up fishing, so you may have the lake all to yourself. With light fishing pressure, mild weather and cooperative fish, what more could you want? ⊡

***Bill Hinnant bagged** this nice largemouth in a millpond during an autumn fishing trip. Old millponds harbor notoriously difficult bass, but they become more active in fall when fishing pressure drops and the water cools.*

Set for Oct. 8-10

Scouts at Occoneechee Camporee Will Get WILD

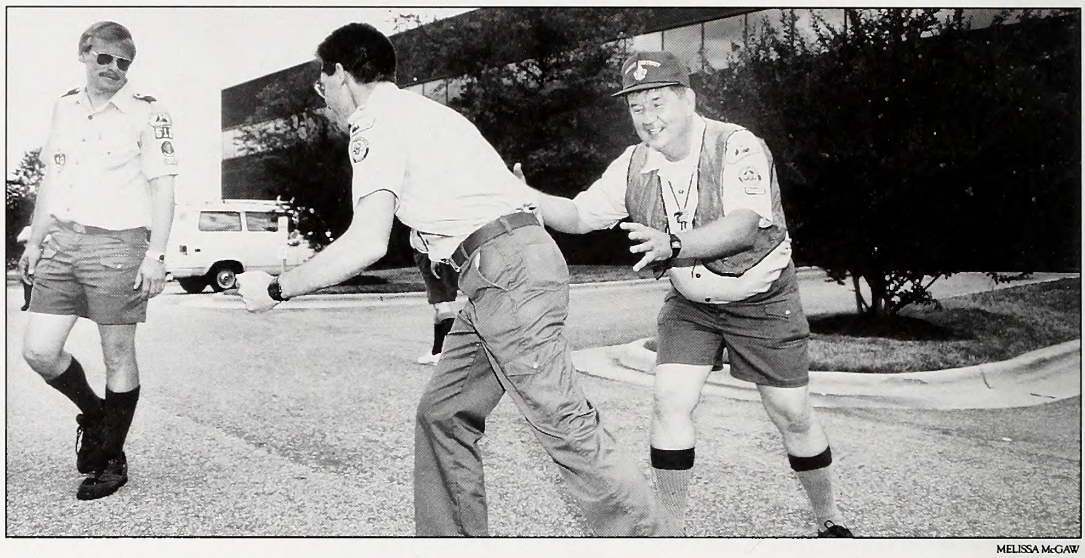
Written and Edited by Vic Venters

At this year's Occoneechee Council Camporee, Cub and Boy Scouts are going to get wild—North Carolina WILD, that is. The theme for this year's camporee, which is expected to draw up to 6,000 Scouts and leaders, will be "All Things Are Connected," the conservation theme for the North Carolina WILD environmental education program.

North Carolina WILD is the state's version of Project WILD, an award-winning national program that can be used to teach ecological concepts and natural resource conservation. The WILD activities at the camporee will be geared toward forest, soil, water and wildlife conservation and ecology with actual hands-on experiences for the campers.

The camporee, to be held Oct. 8-10 at Camp Reeves near Carthage, is being co-sponsored by the N.C. Wildlife Resources Commission and the N.C. Wildlife Federation. Prior to the camporee, the Wildlife Commission's Conservation Education Division will have provided Cub and Boy Scout leaders with training, materials and information on how to use Project WILD to support existing Scout activities and advancement programs.

The Wildlife Resources Commission also has correlated its Project WILD activities to Boy Scout and Cub Scout requirements. "This correlation will not only be used for this camporee, it will also prove helpful to all Scouts interested in using Project WILD activities when helping scouts complete advancement requirements," said A. Sidney Baynes, chief of the Wildlife Commission's Division of Conservation Education. Baynes is also the camporee chief for this year's Occoneechee Council Camporee. A similar correlation to the Girl Scout advancement requirements will be completed this fall.



MELISSA McGAW

This summer, *Cub and Boy Scout leaders received training and materials on how to use the North Carolina WILD environmental education program with scouting activities and advancement requirements.*

Both correlations are being produced through a grant from the N.C. Wildlife Federation and will be available to Scout leaders throughout the country.

For more information on using North Carolina WILD with Scout activities, contact the N.C. Wildlife Resources Commission, Division of Conservation Education, 512 N. Salisbury Street, Raleigh, N.C. 27604-1188.

Wildlife Endowment Fund Report

June 1993

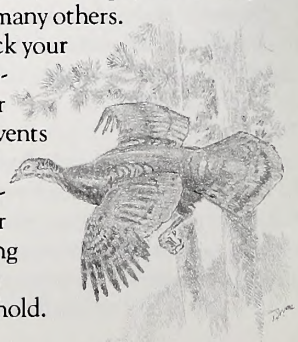
Principal Balance
$18,311,237.30
Interest Earned
$11,854,977.01
Total Receipts
$30,166,214.31
Interest Used
$4,123,817.48
Fund Balance
$26,042,396.83

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

Hunting, Fishing Day Declared

Saturday, Sept. 25, will mark the annual anniversary of National Hunting and Fishing Day. The event notes the major contributions made to wildlife conservation by sportsmen, including $17 billion raised for use in wildlife restoration programs for such species as white-tailed deer, elk, antelope, wild turkey and many others.

Check your newspaper for events local hunting or fishing clubs may hold.



National Group in Research Triangle

African-American Fishing & Hunting Association Forms

It's a fact that African-American sportsmen and sportswomen have been prominently missing from the pages of most American sporting publications and television shows, giving the impression that hunting and fishing are not popular activities among blacks or other minorities.

The fast-growing success of a new national organization headquartered in the Research Triangle Park is dispelling that misleading impression, however. The African-American Fishing & Hunting Association is a relatively new group dedicated to providing a national network for clubs and organizations made up primarily of African Americans. The association also teaches classes in hunting and fishing safety and technique, as well as sponsoring trips and tournaments. They are also working on programs to introduce disadvantaged youths to the outdoors.

The organization was founded in 1990 by life-long sportsman Stephen H. Starks of Durham, a veteran of the U.S. Air Force and IBM. For the first two years, Starks concentrated on organizational efforts in North Carolina, and began taking the association to a national level in 1992.

"We're having great success so far," Starks said, adding that the African-American Fishing and Hunting Association already has about 15 chapters in North Carolina and about 6,000 members nationwide. "I don't want anyone to think our group is preaching racial exclusiveness, though. We are simply trying to fill a void that existed for black sportsmen and sportswomen across the nation. The group allows us to communicate, hold tournaments, travel and get to know each other."

Another focus of the group is to recognize outstanding African-American anglers and hunters who have contributed to conservation activities and to safe hunting and fishing practices. The association has developed a hall of fame and various classifications for rewarding these achievements. "In this country, a lot of very talented black sportsmen have never gotten much recognition or participated in any kind of tournaments," Starks said. "Part of our focus is to see deserving sportsmen get some credit."

Stark said the association is still in the start-up stage in some states. However, he added, many individual clubs around the country are already trading information and trips.

The association is actively seeking new male and female members and officers. Membership is $25 per year. The organization's next meeting will be September 24-26, followed by a meeting in November. For more information, contact the African American Fishing and Hunting Association, P.O. Box 14091, Research Triangle Park, N.C. 27709-4091, or at 1-800-528-5875.

Birds Use Managed Forest

Bald Eagles Hatch at Jordan Lake

KEN TAYLOR

***This spring biologists recorded** the first successful bald eagle hatching at Jordan Lake near Chapel Hill. In May, two eaglets hatched in a nest located on gamelands near the lake. The eagles hatched from an area of mature timber that had been thinned and burned, replicating a natural pine forest. Eagles prefer nesting in tall trees surrounded by an open understory because it allows them to observe potential predators. The nearby lake allows them to obtain plenty of fresh fish for food.*

The 1994 North Carolina Wildlife Calendar Is Here!

With such artwork as Mel Steele's "The Thicket's Edge" (featured on the inside back cover), the North Carolina Wildlife Calendar is sure to sell out.

The works of Robert C. Flowers, Jr., Dan Johnson, Ken Helser, Alan Cheek, Jake Taylor, Shannon Critcher Jones, Robert B. Dance, Bob Herr, Duane Raver, Mel Steele, James A. Brooks, and Dempsey Essick are featured in the 1994 Wildlife Calendar. Order yours today by returning the form below with your check or money order to 1994 Calendar, N.C. Wildlife Resources Commission, 512 N. Salisbury Street, Raleigh, N.C. 27604-1188.

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Office located at: 322 Chapanoke Rd., Raleigh N.C.

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For fund raising and bulk rate information (10 calendars or more), call 919-662-4377. Please allow 6 weeks for delivery.

CALO94

Resident Goose Season Expanded

Early Season Dove Hunting Begins at Noon

VIC VENTERS

***Shooting hours begin** at noon during the first segment of North Carolina's dove season. Opening day is Sept. 4.*

Dove hunters should carefully note this year that there are changes in shooting hours in the first segment of the three-segment 1993-94 dove season.

Dove hunting during the Sept. 4 through Oct. 2 segment will begin at noon each day. Dove hunting hours will revert to one-half hour before sunrise on the Nov. 22 through 27 segment and in the Dec. 13 through Jan. 15 segment. In all three segments, legal hunting hours end at sundown. The daily limit is 12 doves with 24 in possession.

Waterfowl hunters should also note that the special September season for resident Canada geese has been extended from Sept. 16 through Sept. 30. The daily limit is three with a possession limit of six. This September goose season is only open west of Interstate 95. Hunters must also have a special goose-hunting permit which is available free from charge from license agents.

—Bodie McDowell

Calendar

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event.

Sept. 10-12

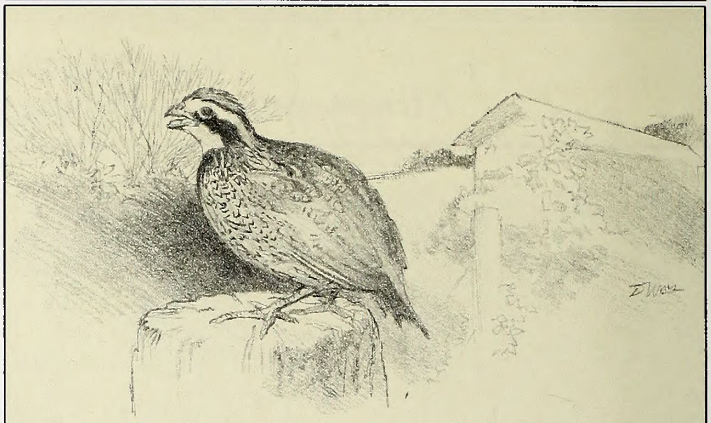
The sixth annual North Carolina Wildlife & Sportsman's Show in New Bern will feature wildlife arts, conservation education exhibits, decoys and sporting collectibles. For more information, contact the New Bern Area Chamber of Commerce, P.O. Box Drawer C, New Bern, N.C. 28563, or call 1-800-437-5767.

Sept. 11-12

The 12th annual Currituck Wildlife Festival will feature wildlife art, woodcarvings, decoys, photography and a duck-, goose- and swan-calling contest. For more information, contact the Currituck Wildlife Guild, P.O. Box 91, Shawboro, N.C. 27973, or contact Nancy Sanderlin at (919) 232-3297.

Sept. 18

The Big Sweep annual waterway cleanup will be held across North Carolina. For more information, call the Big Sweep MCI hotline at 1-800-27-SWEEP.



Deerly Yours

by Vic Venters

As fall deer season opens, be sure to note the quality of the deer herd on the land you hunt. Are populations of bucks and does in balance? Are deer too small? Are there too many does? Do your bucks show mature racks or are they mostly young fork horns or spikes?

If you hunt in a club and/or manage 2,000 contiguous acres or more, you may want to consider enrolling in the N.C. Wildlife Resources Commission's Deer Management Assistance Program. If you join the program, district biologists will help you set up a plan to manage your lands for the healthiest herds possible. If you or your club cannot meet the set acreage minimum, the program allows for two or more clubs with contiguous boundaries to combine acreage and enroll.

Once you are enrolled, a district biologist will visit and draw up a management plan that will provide you with harvest guidelines. The guidelines stress the harvest of does to combat potential overpopulation, and the harvest of only mature bucks, thereby allowing smaller males to grow to maturity. If the guidelines are followed, this management philosophy can increase the size of bucks on your land.

You will need to provide the numbers and ratio of bucks and does harvested annually, antler measurements, deer weight and condition, and jawbone collection for analysis by biologists. From this data, biologists can interpret what management steps need to be taken to improve the deer herd.

Applications can be made anytime, but if you submit an application this fall you will be enrolled for next year's season. The program has proven popular and currently has over 140 clubs and other land managers on its roster. For more information, write the Deer Management Assistance Program, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188.

N.C. Wild Store

Take advantage of these great items and you'll support conservation education throughout North Carolina. Proceeds from the sale of these publications will support the development and production of educational projects and programs.

"North Carolina WILD Places *will become a standard reference...The book combines accurate descriptions and illustrations in a way sure to attract both casual and serious readers. It really is a wonderful addition to the literature about the natural heritage of our state."*

—Fred Beyer, Past President, N.C. Science Teachers Association

North Carolina WILD Places Map Print

Charming, signed limited-edition art print showing North Carolina's wild places as seen by artist Jackie Pittman. 1,000 limited-edition and 100 artist's proof prints. Also available as a poster. 36" x 24".

Item code **E2-4**

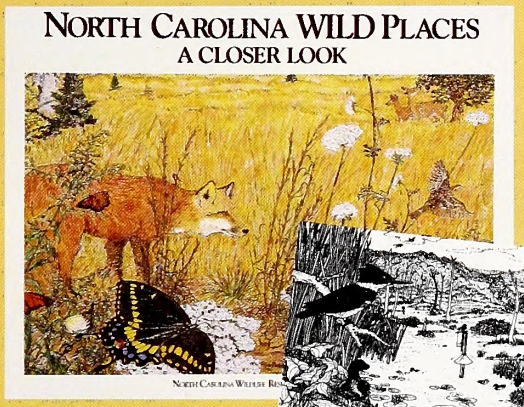
Article Reprints from Wildlife in North Carolina Magazine

"The Spawning Runs." Informative article on the anadromous fish of North Carolina. Two-page map.

Item code **M4**

"Gardens for Butterflies." For the gardener who wants to attract some of nature's most colorful creatures. Species to plant, butterflies that will visit.

Item code **M5**



North Carolina WILD Places: A Closer Look

Easy-to-read text and Anne Marshall Runyon's delightful illustrations make wildlife habitats come alive in this 82-page book. Discusses 13 habitats across the state.

Item code **E1**

North Carolina WILD Places Posters

(Set of 3): Posters of "Old Field" and "Mountain Cove Forest" from *North Carolina WILD Places: A Closer Look*. Shipped folded with poster version of WILD Places Map.

Item code **E5**

WILD Places book and posters.

Item code **E6**

Birdhouses & Feeders: How to Build and Enjoy Them

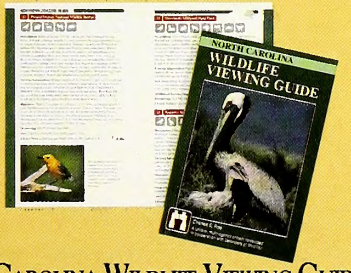
An 8-page illustrative guide to building bird houses and feeders.

Item code **M6**

Lizards of North Carolina

Poster showing all of North Carolina's lizards. One of a series on the state's reptiles and amphibians. 22" x 34"

Item code **P3**



North Carolina Wildlife Viewing Guide

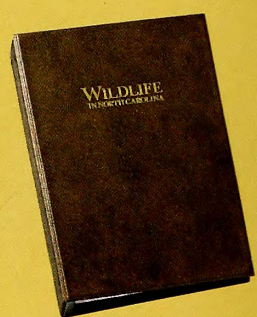
From Cape Hatteras to the Great Smokies, this color guide will lead you to 90 of the state's best wildlife viewing sites.

Item code **N6**

N.C. *Wild* Store

Wildlife in North Carolina Magazine

Excellent color photography and great articles on hunting, fishing, natural areas, wildlife research and our environment. See our easy-order subscription form on the next page.



Wildlife in North Carolina Magazine Binder

Store 12 issues in this sturdy binder.

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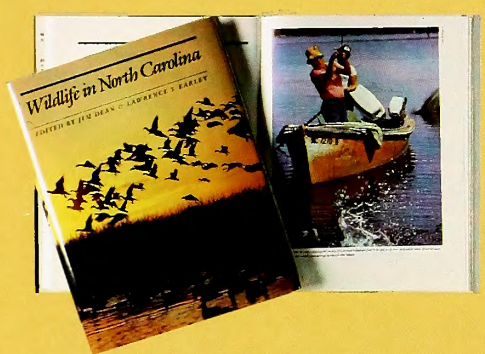

Wildlife in North Carolina Book

The best of *Wildlife in North Carolina* magazine.

Item code M3

N.C. WILD Art Print "Feelin' Lazy"

Sales of artist Robert Flowers' print will benefit Project WILD and other wildlife programs. 24" x 18".

Item code P1-P2

Wildlife Habitat Art Prints

Five colorful limited-edition prints depict wildlife in five habitats: mountain forest, coastal island, Sandhills longleaf pine forest, creek and beaver pond. 18" x 24".

Item code N1-N5

WILDlife Profiles Sets 1, 2, & 3

Each set features 10 animal fact sheets. W6 is a new arrival.

Item code W4-W6

All Things Are Connected (Video)

12-minute video uses the words of Chief Seattle to introduce environmental ethics.

Item code W1

This Land is Sacred (Teacher's Guide)

Classroom activities to accompany the Chief Seattle video.

Item code W2

All Things Are Connected & This Land is Sacred

Video and Teacher's Guide package.

Item code W3

To subscribe to Wildlife in North Carolina magazine, fill out the subscription form at right. To order any of the following materials, complete the educational materials order form (lower right).

ITEM CODE

M2. Wildlife in North Carolina Binder. **$6.75.**
M3. Wildlife in North Carolina Book. **$12.**
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Four muskrats feed on this shallow, flooded mudflat, unaware of their mirror images below.

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Home in the Range

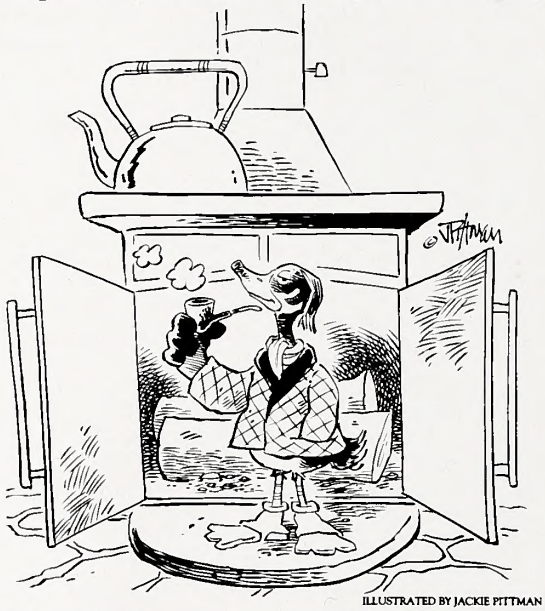
by Jim Dean

With the afternoon hike behind them and the sun dipping into the trees, my brother and his family were no doubt thinking of supper and an evening fire as they walked through the barren fields and up the dirt road to the old tenant house we use as a rough camp. It had been hot in the direct sun, but winter is only temporarily treed in early March. It waits to pounce from any shadow. Nobody was thinking about the strange noises they'd been unable to locate in the cabin earlier.

John was getting ready to chop some kindling, while Beth and the girls, Jessie and Melissa, began to get ready to cook supper. It was Melissa who lifted the eye of the wood cook stove.

"Dad," she said calmly. "There's a duck in the stove."

And so there was. Obviously, it had come down the chimney, crawled through the flue and down the 6-inch pipe, then somehow squeezed past the damper into the back of the stove. A handsome—if somewhat sooty—male wood duck peered back at them from the narrow draft between the oven and the side of the stove. John captured it gently, and after everyone had admired it a moment or two, he carried it out on the back porch and turned it loose. It flew off.



ILLUSTRATED BY JACKIE PITTMAN

Oh well, they thought, that was curious. After all, by the time most ducks get into a stove, they've been plucked and stuffed with apples and celery—and their presence as a dinner guest is never by choice. But things were about to go from curious to outright strange.

Having successfully extracted the duck from the Home Comfort in the kitchen, John decided to ward off the evening chill by building a fire in the Franklin stove in the front room. He wadded up some newsprint, piled up some kindling, struck a match to the paper and closed the fire door. Moments later, there commenced from within a clamorous flapping.

He flung open the fire door and a female wood duck *flambe* fell out in a shower of burning kindling. John said he could almost imagine it wiping a singed brow with a wing and saying, "Suffering succotash, it was getting hot in there."

While Beth dowsed the scattered embers, John did what he could to snuff out the flaming duck. Since the duck was understandably agitated, he quickly carried it to the porch.

"I never knew a duck could run so fast," he said. "It made a bee-line 100 yards through the field and hit the pond at a dead run." John swears he heard a "Psssssssssh...Ahhh" when it plopped into the water.

At this point, you may be wondering why ducks would fly down a chimney and sit in a stove. Believe it or not, it's perfectly natural. Unlike most ducks that nest on the ground, wood ducks normally nest in hollow trees much the same as squirrels and some owls. The ducks usually begin looking for a nesting site sometime in February or early March. The eggs hatch in the spring, and the young ducklings climb out of the hollow and plop safely to the ground or water, sometimes from heights of 20 feet or more.

Early in this century, wood duck populations fell to critical levels when favorable nesting sites were lost to extensive logging in hardwood bottomlands. Beavers had also been virtually trapped out, and their ponds provide prime wood duck habitat. Furthermore, until 1934, wood ducks were subject to market hunting for the millinery trade. During the past 20 years, however, the construction and placement of countless thousands of wood duck boxes by waterfowl hunters and other conservationists has helped restore favorable nesting habitat. Beavers are also back—amidst considerable controversy—yet they've clearly helped return wood ducks to prosperity. Indeed, these handsome ducks are now the most common waterfowl species in most southeastern states, including North Carolina.

Yet, despite the profusion of nesting boxes and beaver ponds, an open chimney still looks a lot like a hollow tree. It's not difficult to believe that woodies investigating the chimney on our cabin might think they'd found a "for rent" sign on Graceland. Here was housing with a formal entrance leading to a hallway between two rooms. And talk about location; it even had a pond in the back yard. How were they to know someone would set fire to their bedroom? The truth is that lots of wood ducks are attracted to chimneys. Ask Mike Gaddis.

A few years ago, he built a log cabin with a stone fireplace. One day the following spring, he unlocked the door and stepped inside. Pictures were off the wall, lamps were knocked over. Soot was everywhere. A female wood duck sat in the middle of the floor looking at Mike as if to say, "Sorry about the damage; just put it on my bill."

As for us, we're taking our property off the market by placing a grate over the top of the chimney. If we decide to cook a big pot of homemade soup next spring, we'll bring our own quackers.

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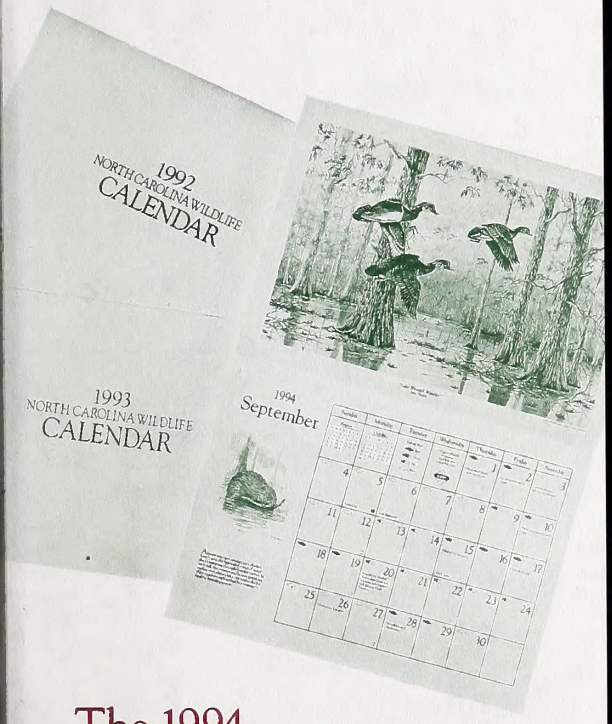

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and also to the environment we share with them.

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Wildlife Through the Year *by Vic Venters*

Cover *A southern flying squirrel pauses at a woodland pool for a drink of water unaware that a remote-controlled flash camera is waiting. Photographed by Steve Maslowski.*

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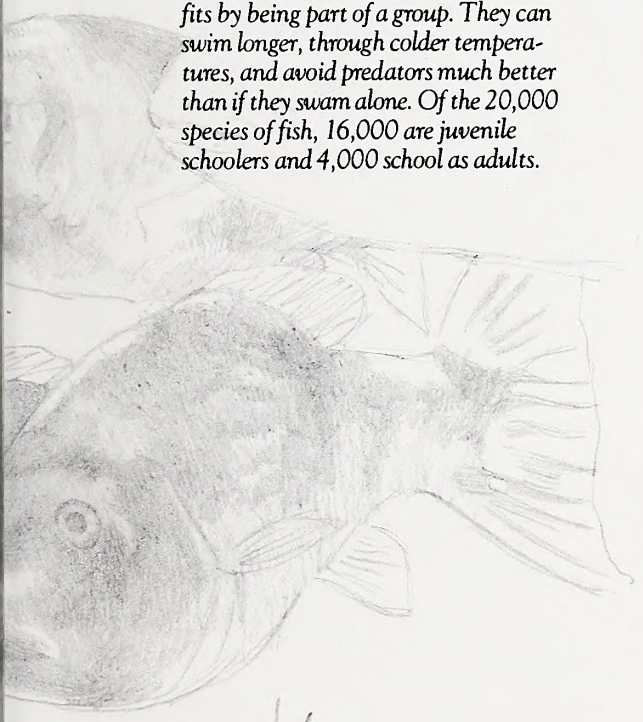
Bobcats, like many predators, *hunt alone and thus carry on a more solitary life. Solitary living helps the cat maintain a secure food base for its needs and the needs of its young. Social living would endanger its food supply.*

Buck white-tailed deer *are solitary during the rut when they compete for does in their harems. But after the mating season, when their antlers fall off, bucks congregate in bachelor herds and become more social.*

Loners and Socialites

written by Lawrence S. Earley/illustrated by David Williams



***Social and solitary** animals benefit from very different behavioral strategies. Schooling fish enjoy many benefits by being part of a group. They can swim longer, through colder temperatures, and avoid predators much better than if they swam alone. Of the 20,000 species of fish, 16,000 are juvenile schoolers and 4,000 school as adults.*

***Bobwhite quail roost** in coveys with heads out, bodies pressed together for warmth and protection. Circled up like miniature wagon trains, quail share body heat during winter and explode in all directions when threatened by a would-be predator.*

Honey bees and cicada killers have very different ways of raising their young. The cicada killer, a large wasp, lays a single egg on top of a paralyzed cicada in a burrow she digs. When the egg hatches, the larva feeds off the cicada but has nothing more to do with its parent. Honey bees, on the other hand, live in complex communities involving castes of workers, some of which do nothing but take care of the young.

We call one a "social" insect and the other a "solitary" insect. It's a division that's widespread within the animal kingdom. Many animals seem content to be loners while others are practically social butterflies.

Niko Tinbergen, the great student of animal behavior, once observed that just about every animal can be considered social at one time or another. Even the most solitary species have to cooperate to mate, for example, and in many species, the males and females share the responsibilities of raising young. Tinbergen even considered fighting to be a social function of critical importance to the health of a population.

But defined more rigorously, social animals are those that cooperate for the good of a group. These animals don't just "stumble" together, like moths on a summer night drawn to the same bright light. They associate because they get special benefits from being in a group.

Schooling fish like menhaden, for example, conserve more energy and even consume less oxygen than they would if they were alone. Being in a school also gives them more protection, as every fish acts like a watchman for the entire school. The moment a predator swoops onto a school of millions, the individuals nearby make a course adjustment that is transmitted to the entire school in less than a second. Though a huge school attracts predators, its advantages evidently offset the disadvantages.

Starlings are another social species, gathering by the thousands each fall and spring before migrating. Herding animals such as wildebeest and caribou are highly social species, as are social wasps, ants and termites.

Given the benefits of a group, then, why doesn't every species herd, school or flock? The answer is that there are equally as many benefits to living alone. Consider two sunfish, the bluegill and the pumpkinseed. In spring, bluegill males gather in dense colonies to scoop out their nests on muddy pond bottoms. Colonial bluegills can defend themselves better against egg-eating catfish and snails. A single fish is poorly adapted for defending its eggs because of its soft mouthparts.

A pumpkinseed, on the other hand, is equipped with mouthparts that pick up and crush mollusks. It could inflict a nasty bite on a marauding catfish and easily remove a snail from its nest. This may be one reason why pumpkinseeds nest more privately, especially since there may be costs to group nesting. Bluegills, for example, may well lose some of their eggs to their bluegill neighbors next door. They will certainly undergo more competition for food and mates, and they will be be more vulnerable to the spread of disease and parasites. The pumpkinseed may have less to gain, and probably more to lose, from social living.

Many other animals have favored solitary living. Predators like bobcats, foxes, groundhogs and bullfrogs tend to be solitary because they need a lot of food to sustain themselves. But even small creatures tend to space themselves out over the landscape.

Like other adaptations, living singly or in groups is a species' response to the challenges of its environment, helping the species stand the ultimate test of time—survival.

BUCKS IN BATTLE

When the big boys go to the fall dances, there's more at stake than ritual. The winner is more likely to pass along strong, healthy genes.

photographed by William S. Lea © 1993

Like jousting knights, two evenly matched bucks spar for dominance during the fall and winter rut, the breeding season for white-tailed deer. Only the dominant bucks win breeding rights, Nature's way of ensuring that genes from the healthiest and hardiest are passed on. Although most fights are brief, lasting seconds, large bucks will sometimes spar for several minutes until one retreats. Fatalities are rare, but injuries—such as broken tines, cuts and punctured eyes—are not uncommon. It's sometimes hard to tell the winner from the loser.

BUCKS IN BATTLE

Antler fights and sparring don't always mark buck encounters during the rut. A dominant buck's lowered ears and antlers, backed with a baleful stare, are often enough to drive smaller competitors away. If this isn't enough, bucks will sometimes blow a wheeze-hiss through their nostrils, a warning to interlopers that a fight may be imminent. Dominance is established when the loser retreats.

The Mighty Oaks

The massive oak is a deserving symbol of strength, durability and character. Hundreds of species exist worldwide, many in North Carolina.

written by Eddie Nickens ©1993
photographed by Melissa McGaw

To the ancient Greeks, oaks were held in highest esteem. The Grove of Dodona boasted an oak considered the very seat of Zeus. The rustling of leaves on the sacred tree and the babbling of a spring that trickled from its roots were portents likened to the voice of the god himself. Centuries later the druids, the priests and wizards of ancient Gaul, were still worshiping the oak, in particular the English oak, *Quercus robur*. We may not worship oaks today, but we are still likely to associate them with strength, durability and character. Of all the trees in all the world's forests, the oak typifies our vision of the most nearly perfect tree.

Yet there is not just one oak. Indeed, there are some 450 species of *Quercus* worldwide, approximately 68 in North America and, depending on the source, between 31 and 50 species that occur in North Carolina. Broadly speaking, our oaks are divided into two groups: the white oaks and the red oaks. To the casual observer, the two differ visually in that the white oaks have smoothly lobed leaves, whereas red oak leaves are pointed. There are other, less obvious, differences. Red oak acorn shells have an inner surface lined with tiny hairs, while the inner shells of white oak acorns are smooth. Also, the acorns of white oaks mature in the first year after fertilization, while red oak acorns mature the second year after fertilization.

Oaks are no doubt best known for the wood they produce. Whenever strength is needed, oak is almost invariably the wood of choice. Yet strength is not its only asset. Handsome furniture is made of oak, and the once-utilitarian and relatively inexpensive Mission oak furniture of the 1930s has become highly collectable. And, of course, oak is highly prized for the fireplace.

Apart from the value of their wood, their shade and their worth to the human spirit, oaks play a vital role in providing food for wildlife.

"Everything that creeps, crawls, wriggles and flies will eat acorns," says Fred White, assistant state director for forest management for the N.C. Forest Service. In a study of 15,000 acorns, outlined in *The Secret*

Life of the Forest by Robert Ketchum, 83 percent were ingested by animals, 6 percent were eaten or spoiled by insects, 10 percent were "naturally imperfect" and less than 1 percent sprouted. Half of those never grew to sapling size.

The size of the "mast crop" or acorn fall tends to run in cycles on an average of five years. While oaks will produce acorns each season, the crop of acorns is dependent on proper moisture and proper temperatures at the proper time. Last year much of North Carolina saw a bumper mast crop, so this year's crop of acorns will likely be relatively light.

Oak trees have also figured in human consumption for centuries: the leaves and acorns have been, with varying success, brewed, boiled, beaten and baked into coffee, beer, bread and wine. Those who have duplicated these dietary efforts today come to a universal accord: thank goodness for real coffee, real beer, real bread and good *vino*. Even so, life would be far tougher without these stalwart trees.

North Carolina is home to many oaks, and these seven are especially noteworthy.

***This massive** white oak shades a tenant house long since abandoned. Here, relatively safe from chainsaws, such sentinel trees often reach their maximum size.*

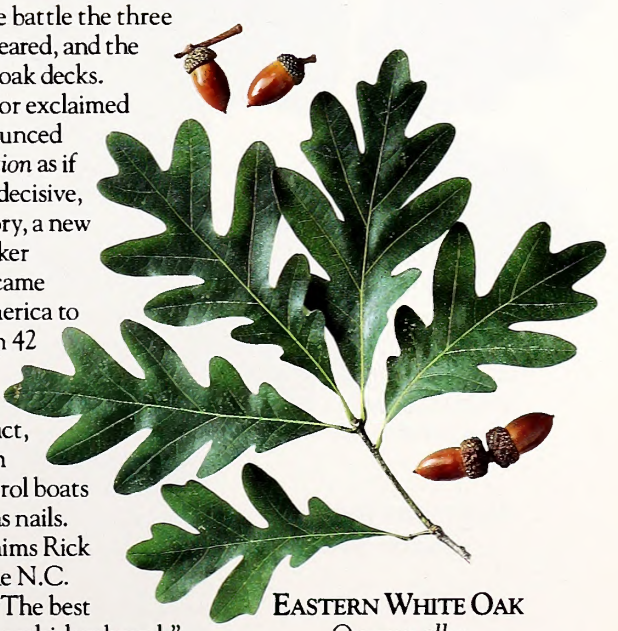
Eastern White Oak

Leaves: Alternate simple, 5 to 9 inches long, with deep finger-like lobes. Acorns: 3/4 inch to 1 inch long, light brown, with shallow, warty, saucer-like cups.

With its scaly bark and full crown, a white oak upwards of 100 feet commands attention, and it didn't take the early settlers long to discover the white oak's utility. As early as 1625, reports Rebecca Rupp in *Red Oaks and Black Birches: The Science and Lore of Trees*, white oaks in the New World were being shipped to the Old. Jamestown planters ran the trees through wind-driven sawmills and exported the planks home to England. The British, however, were reluctant to use the straight-grained New World wood in their naval vessels. After all, the British held, no wood could have matched their beloved English oak, *Q. robur*, for strength.

Then, two months into the War of 1812, one of young America's first warships, the U.S.S. *Constitution*, encountered a lone British frigate off the coast of Nova Scotia. After a 35-minute battle the three masts of the *Guerriere* had been sheared, and the white flag raised over her English oak decks. According to legend, a British sailor exclaimed during battle that cannonballs bounced off the white oak hull of *Constitution* as if she were made of iron. With that decisive, if strategically unimportant, victory, a new world power, a legend and a moniker emerged. Old Ironsides, as she became known, would lead the young America to world leadership, go undefeated in 42 sea battles, and lay to rest any qualms about the strength of *Q. alba*. As late as World War II, in fact, white oak went to war, in the form of keels on mine sweepers and patrol boats —anti-magnetic, and still tough as nails.

"But to heck with boats," exclaims Rick Hamilton, forestry specialist at the N.C. Cooperative Extension Service. "The best thing to come from a white oak is a whiskey barrel."



Eastern White Oak
Quercus alba

LIVE OAK
Quercus virginiana

Indeed, many would agree, including the French, who imported white oak staves for wine barrels. Rum makers of the West Indies relished the wood for their rum casks. White oaks have tiny cells called *tyloses* that partially clog the springwood vessels through which nutrients move up and down the tree trunk, branches and twigs. Because of those minute cells, white oaks can be used for "tight," or waterproof, cooperage. Barrels made from the various red oaks are fine for flour, but lack tyloses and are too porous for liquid storage.

To many, any mature white oak is worthy of respect. Alone on a field edge, the white oak in summer looms like an enormous green thunderhead on the horizon, its crown unmistakable from afar. Even deep into winter, when all other hardwoods are bare, the white oak holds tenaciously to its browned leaves, rattling them in twiggy fists with the bitter wind, ever drawing attention to itself.

Live Oak

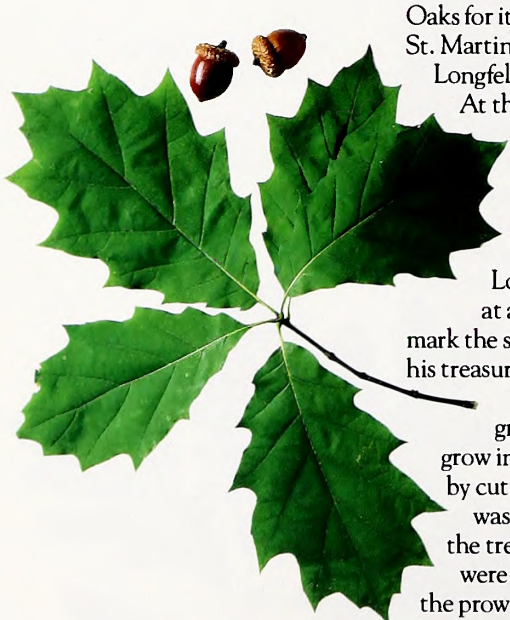
Leaves: Simple, evergreen, oblong, leathery and relatively small, seldom surpassing 4 inches in length. Acorns: About 1 inch long, oblong, dark brown to almost black. Unlike many other oaks, clusters of three to five acorns grow on a long stalk, called a "peduncle."

Few symbols recur with such regularity in Southern lore and iconography as *Q. virginiana*. Ashley Wilkes' estate in *Gone With the Wind* was named Twelve Oaks for its grove of these trees. Evangeline's Oak at St. Martinville, La., is said to mark the spot where Longfellow's heroine waited for her lover, Gabriel. At the entrance to Jefferson College in southern Mississippi is a row of trees now known as the Aaron Burr Live Oaks, under which Thomas Jefferson was tried for treason and acquitted in 1807. And the two massive Lafitte Oaks of Louisiana's Jefferson Island—not an island at all, but a raised "salt dome"—purportedly mark the spot where the pirate Jean Lafitte buried his treasure.

The stately live oaks grow squat and gnarled with lots of limbs. Because the trees grow in such odd patterns, little strength is lost by cutting against or across the grain. The wood was used extensively for shipbuilding, because the tree's large branch sections and odd shapes were perfect for deck supports, breasthooks in the prow and curving "compass timbers." In fact, the nation's first forest reserve was established at a live oak grove near Pensacola, Fla., in part to ensure a supply of live oak for warship construction.

But these days, live oaks are under siege. Coastal development has leveled large tracts of maritime forests, and remaining tracts are facing a new crisis: the drilling of wells for more and more beach houses, hotels and golf courses. Very resistant to salt spray and tolerant of salinity levels that kill many other trees, live oaks might succumb to this subterranean threat. Botanists are concerned that those forests that remain uncut might not survive the lowering of the water table in the sandy soils in which they thrive.

Still, there are plenty of gnarled old soldiers around. Draped with gray beards of Spanish moss, live oaks line many Main Streets in eastern North Carolina, mark the gateways to many a forgotten plantation, and hold up more than a few swings and treehouses.



NORTHERN RED OAK
Quercus rubra

Northern Red Oak

Leaves: Simple, alternate, 5 to 9 inches long, divided into seven to nine lobes with the telltale bristle tops of the red oak group. The smooth undersides of the leaves distinguish them for the look-alike black oak. Acorns: large, up to 1 3/4 inches long, with only the tip of the base covered in a dark brown, shallow, saucer-like cup.

In a 6,400-acre tract of trees where the Blue Ridge Parkway and the French Broad River meet, the future of forestry in the South is undergoing an important revision. Researchers at the Bent Creek Research and Demonstration Forest have developed a way to give oak trees a head start on regeneration. Traditionally,

oak regeneration has been stymied due to competition from other tree species, particularly yellow poplar. Today, however, silviculturists think they've found the key to growing oak trees. Using northern red oaks as a test species, says Marsha Wikel, program manager for the demonstration forest, researchers have determined that oaks can compete with faster-growing species if the light level in the forest midstory is increased without opening up the forest canopy. Midstory vegetation is removed from the forest, giving *Q. rubra* the chance to shoulder above other trees and become established.

By tipping forest management to favor red oaks, it's likely both man and beast will benefit. Red oaks grow relatively quickly, allowing large timbers to be milled from the trunks in as few as 60 to 80 years. These oaks also produce heavy mast crops. A single healthy red oak may produce upwards of 15,000 acorns in a bumper mast year, providing significant and valuable forage for woodland inhabitants such as deer, squirrels, turkeys and many others.

"For those of us who have been fretting about oaks for long," says Fred White, "this is high drama."

A common tree in the mountains, northern red oaks are picky about where they like to put down roots. Not happy with extremes of moisture, *Q. rubra* tends to grow best on northern and eastern slopes and in mountain coves, and are rare east of the Piedmont.

Water Oak

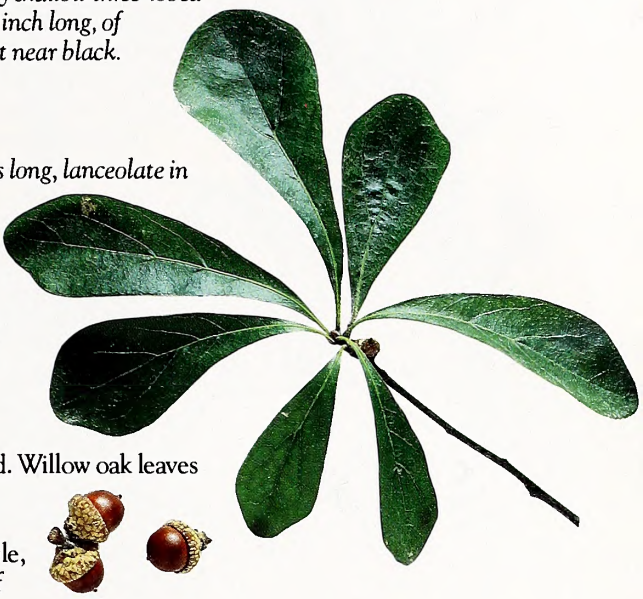
Leaves: Simple, but variable in shape, mostly oblong, wider at the tip, often with a very shallow three-lobed profile. Acorns: 1/2 inch to 2/3 inch long, of variable colors, brown to almost near black.

Willow Oak

Leaves: Alternate, 2 to 4 inches long, lanceolate in shape. Acorns: Small, about 1/2 inch in diameter, yellow-brown to greenish.

The water oak and willow oak are kissing cousins. Indeed, they often hybridize, much to the consternation of dendrologists. When pure examples are found, however, they are easily identified. Willow oak leaves are very similar to true willow leaves, except that each willow oak leaf is tipped with a tiny bristle, which identifies it as a member of the red oak family. Water oaks can vary widely in shape, but their leaves are similar to willow oaks except they are almost always wider at the tip. Hold a water oak leaf by the stem and it resembles a bell.

Willow oaks are often called pin oaks, although



WATER OAK
Quercus nigra

KEN TAYLOR

***Live oaks** characteristically spread their heavy, vaulted boughs in a wide canopy. The wood is prized by ship and boat builders, particularly where exceptional strength is needed for frames, hanging knees or other curved pieces.*

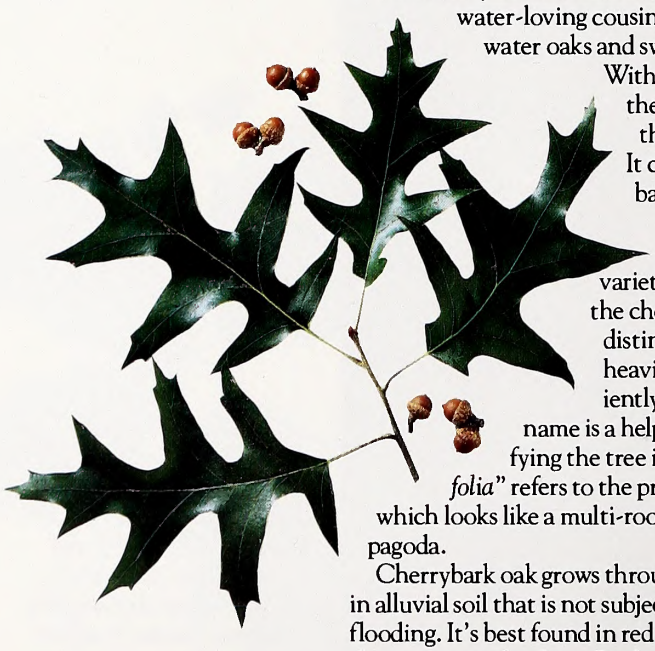
WILLOW OAK
Quercus phellos

the true pin oak is *Q. palustris*, named for its tough branches used in timber pinning. Colonial lumbermen knew the willow oak as the shingle oak, for its wood was favored for roof construction. Because water and willow oaks thrive in oxygen-depleted soils, they do well in tightly compacted urban soils, and are commonly planted in parks.

Despite its name, however, the water oak does not grow *in* water. Only one North Carolina oak, the overcup, will consistently tolerate truly saturated soils. But the water and willow oaks do grow well along the natural levees that hem in many of our Coastal Plain blackwater streams. Heavy producers of acorns, water and willow oaks make up in quantity what they lack in fruit size, often covering the ground beneath their boughs with their smallish acorns. According to *Oaks of North America* by Howard Miller and Samuel Lamb, there are approximately 1,000 clean willow oak acorns per kilogram, compared to 260 white oak seeds per kilogram.

Cherrybark Oak

Leaves: 6 to 7 inches long, with prominent leaf lobes at a right angle to the ribbed main vein. Acorns: Small, about 1/2 inch long, with the lower third enclosed in a shallow cup.



CHERRYBARK OAK
Quercus falcata var. *pagodifolia*

The cherrybark oak is often found with its other water-loving cousins, the willow and water oaks and swamp chestnut oak. With its flaky, scaly ridges, the reddish bark of this tree is a giveaway: It closely resembles the bark of a mature black cherry tree. Officially classified as a variety of southern red oak, the cherrybark oak has a distinctive foliage and heavier wood. Conveniently, the cherrybark's name is a helpful clue for identifying the tree in the field. "*Pagodifolia*" refers to the profile of the leaf, which looks like a multi-roofed Oriental pagoda.

Cherrybark oak grows throughout the South in alluvial soil that is not subjected to protracted flooding. It's best found in red river bottoms—those streams that have Piedmont origins—and hardwood plattes in the Coastal Plain. In the right habitat, says Fred White, you can "plant cherrybark oaks and walk away, and they just grow lickety-split." That low maintenance makes them attractive to forest managers, and the state of North Carolina actively collects cherrybark oak acorns for reseeding programs. The National Champion cherrybark oak grows near South Mills, N.C., towering 105 feet over nearby State Road 1231.

Swamp Chestnut Oak

Leaves: Ovate, broader toward the point, with no lobes like other white oaks but with wavy or "toothed" edges, and covered underneath with a downy fuzz. Acorns: Large, up to 1 1/2 inches in length, with a deep bowl-shaped cup.

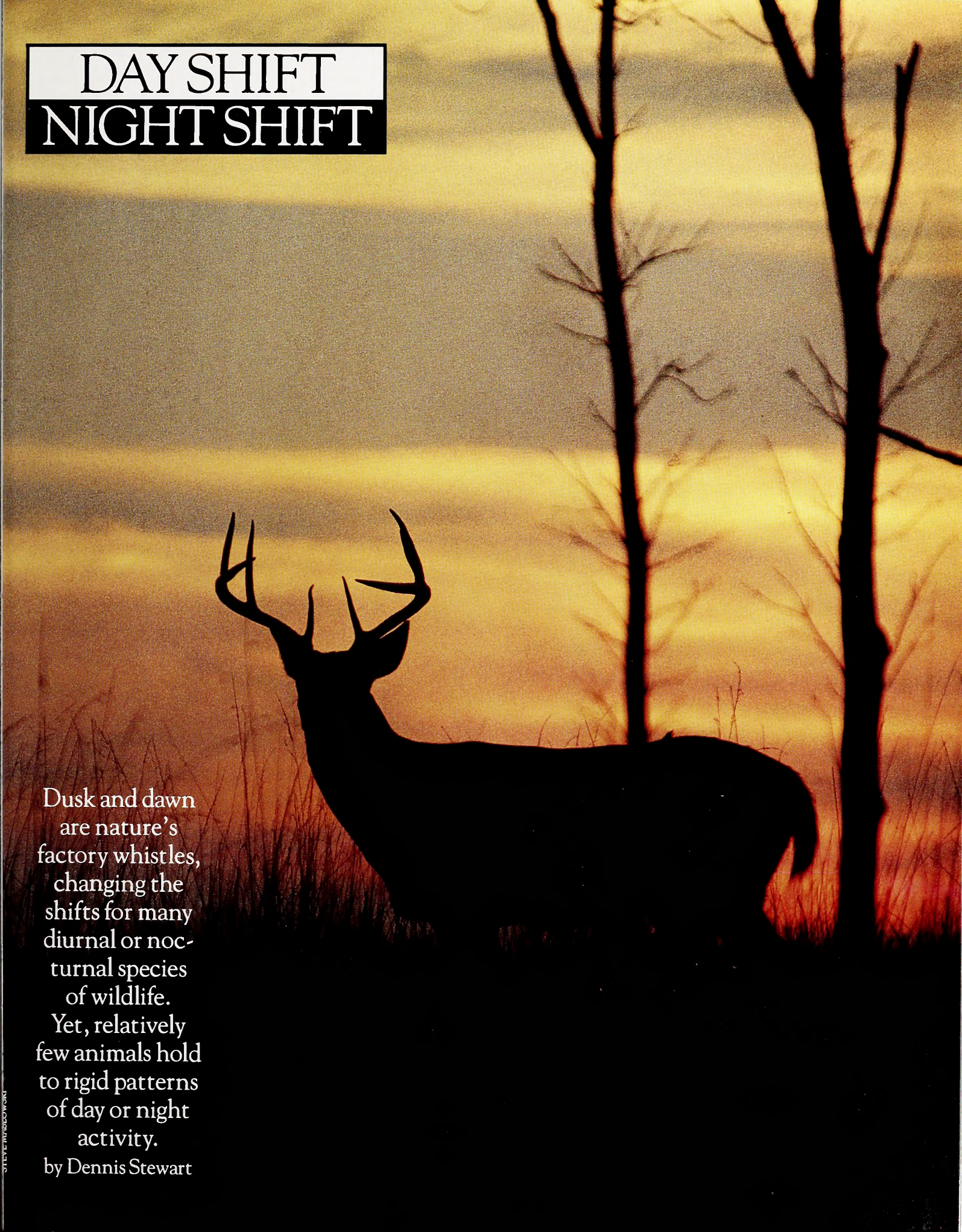
Two hundred years ago the swamp chestnut oak was likely one of the most universally recognized oaks in the woods; certainly it was one of the most beloved. Its large acorns lacked the high levels of tannin found in the fruits of other oaks, and were sweet enough to be eaten from the hand. They were relished by Native Americans, who pounded the acorns into a kind of flour. Later, settlers discovered that their cattle were equally fond of the sweet nuts, and gorged on the mast each fall. The tree was then known as the "cow oak."

Long before Francois Andre Michaux lent his name to the swamp chestnut oak it was also known as the "basket oak." The disjunct between what foresters call "early" and "late" wood inside the growth rings is very sharp, so swamp chestnut oak splits easily, and very thin strips of wood, called "splints," can be fashioned into baskets. Later, those splint baskets were a mainstay of plantation life, as slaves filled them with cotton and carried them from field to farm wagon.

Found throughout the Piedmont and Coastal Plain, but rarely in the mountains, the swamp chestnut is primarily a bottomland species. The tree thrives in similar habitat as the cherrybark oak, but has a much wider range. A close relative, the chestnut oak, *Q. prinus*, grows in a different habitat, preferring dry or rocky upland soils of the Appalachians. Its leaves, similar to the swamp chestnut, are not as broad toward the point. ☐

SWAMP CHESTNUT OAK
Quercus michauxii

DAY SHIFT NIGHT SHIFT



Dusk and dawn are nature's factory whistles, changing the shifts for many diurnal or nocturnal species of wildlife. Yet, relatively few animals hold to rigid patterns of day or night activity.

by Dennis Stewart

DAY SHIFT NIGHT SHIFT

STEVE MASLOWSKI

Alert in its burrow, *the long-tailed weasel surveys its forest domain for prey. Common throughout North Carolina, this weasel can't afford to be either nocturnal or diurnal, but must feed actively day and night. Its metabolism is so high that frequent feeding is essential to its survival.*

On a late April morning, well before daylight, I threaded my way through tangles of vines, briers and fallen tree branches in an eastern creek bottom. I was on my way, I hoped, to a rendezvous with an elusive wild turkey. After finding a dry spot at the base of a large tree, I checked carefully with my flashlight to make sure I wouldn't be sharing my post with a canebrake rattlesnake or a copperhead. Then I made myself comfortable and began to check out my surroundings.

Anyone who has spent much time in a bottomland hardwood forest in the dark knows that it doesn't take long for your imagination to play tricks on you. Just as the stumps and snags began taking ghostly shapes, a large object glided to a perch on a branch about 10 feet away. *What was that?* Slowly, the silhouette of a barred owl took shape against the night sky that was beginning to be suffused with faint light from the rising sun. The only other sounds were those of frogs, crickets and numerous other insects.

Gradually, tree trunks began to take shape as morning light flamed on the eastern horizon. Cardinals, wrens and woodthrushes were the first animals to begin their songs. They were followed by the sounds of three playful squirrels in the trees above me and numerous raucous crows. The owl flew into a cavity in an old cypress tree where it uttered its immemorial cry: *Who-cooks-for-you; who-cooks-for-you-all?* A short distance up the creek two gobblers began talking to each other. A herd of deer nervously walked within a few yards of me while a cottonmouth slipped beneath the root mat of an old oak tree on the creek bank.

I'd always thought of this moment of the day as the forest wake-up call. Yet on this morning it suddenly occurred to me that perhaps the forest had never been asleep! Wasn't it more like a factory rumbling with life 24 hours a day? And wasn't the activity I was watching at dawn simply a change in shifts—the nocturnal animals retiring to their shelters while the daytime or "diurnal" animals packed their lunch pails?

The answer, unfortunately, isn't a clear yes. It's more like a "Yes, but. . . ."

Animals are active at certain times of the day and not at others not only because of their evolutionary adaptations. Other factors such as food availability, predator avoidance, weather or avoidance of humans seem to play equally important roles.

Many animals are clearly adapted to a nocturnal or diurnal existence because they have evolved certain adaptations to exploit food available during these times of day. In the bottomland hardwood forest I was sitting in, for example, the barred owl is primarily a nocturnal species. Owls may prey on moths, small mammals and some bird species during low-light conditions because they can detect even minor sounds and precisely locate the source of the sound. Because the ear slits have a different size and even shape, sounds reach each ear at slightly different times. This evolutionary adaptation helps the owl zoom in on the

STEVE MASLOWSKI

Like all owls, *the barred owl is mostly nocturnal, although many owls are also active during twilight hours. The owl's adaptations for night-hunting include large eyes, serrated feather tips to muffle the sound of its flight, and excellent hearing to pinpoint even faint noises in almost total darkness.*

JACK DERMID

source of the sound, even if it's a tiny mouse running along the forest floor. Its facial discs help to funnel sound toward the ears; in fact, owls can move their facial discs to pick up sounds from afar. Its eyes have many more rods than daytime creatures, making its vision much more sensitive at night. Another adaptation, the soft edges of its wing feathers, makes the owl nearly silent when it flies. These three adaptations are efficient tools that help the owl hunt food in the dark.

A different set of tools is employed by another nocturnal species located in bottomland hardwood forests, the bat. These creatures rely upon a completely different sensory system for flying in the night and capturing their prey—echolocation. Bats basically "see" with their ears. They send out a series of high-frequency sounds and listen for the echoes that bounce back in milliseconds. Remarkably, bats can distinguish the echo of an obstacle like a tree from that of a plump and edible moth.

Although echolocation would work equally well during daylight hours, most bats feed upon insects that are active mostly at night. Also, since bats do not have defense mechanisms, especially against avian predators, nocturnal activity reduces their vulnerability to predation.

In contrast to owls and bats, most hawks are primarily diurnal because they rely more heavily on sight to feed. Although most birds have sharp vision, hawks do not have the offset ear canals of owls and their vision is not adapted to darkness as is owls'. Consequently, they cannot depend exclusively on hearing to locate their food. Also, many birds depend upon foods that can only be detected during the day. The wild turkey, for example, feeds mostly on insects, fruits, seeds, berries and vegetation. Woodpeckers must rely on the ability to see (or, possibly, hear) insects embedded in trees or they must find fruits and seeds by sight. Hummingbirds rely on vision and perhaps smell, to detect nectar producing flowers.

Thus, many animal species are active when their food is available and when they can use

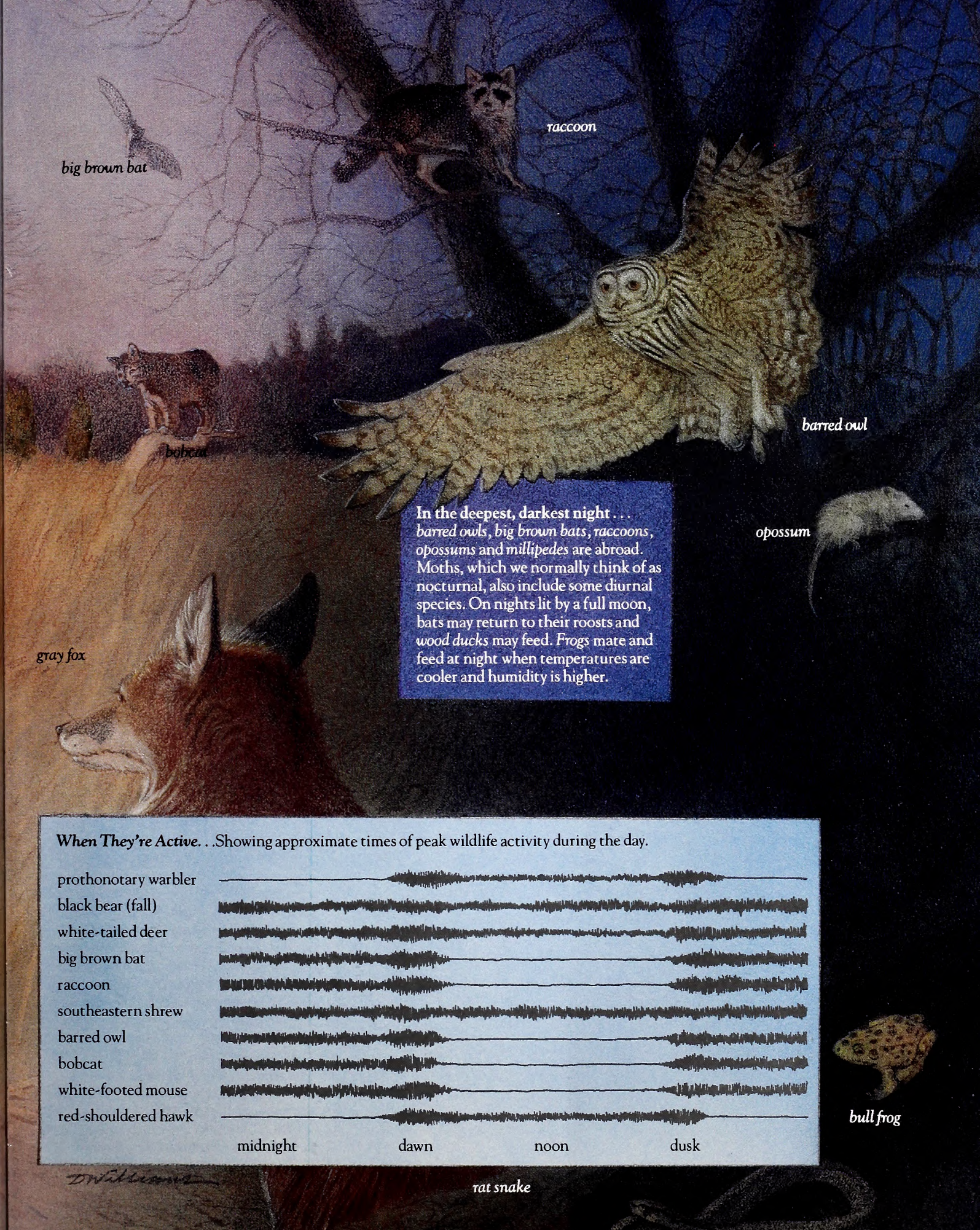
***The diurnal-hunting** red-shouldered hawk and the nocturnal barred owl are both bottomland species, although the hawk hunts by day and the owl by night. The two species hunt similar prey yet don't compete because they are active at different times of the day.*

WILDLIFE by Night & Day

Wildlife species reduce competition by spacing themselves out over the day as well as over the landscape.

Twilight . . . in the half light between day and night, many species become most active. "Crepuscular" creatures include *white-tailed deer, foxes* and *bobcats*. Mammals can adjust their activity patterns better than other animal groups. For example, deer become more nocturnal when humans are around, and more diurnal when they are not.

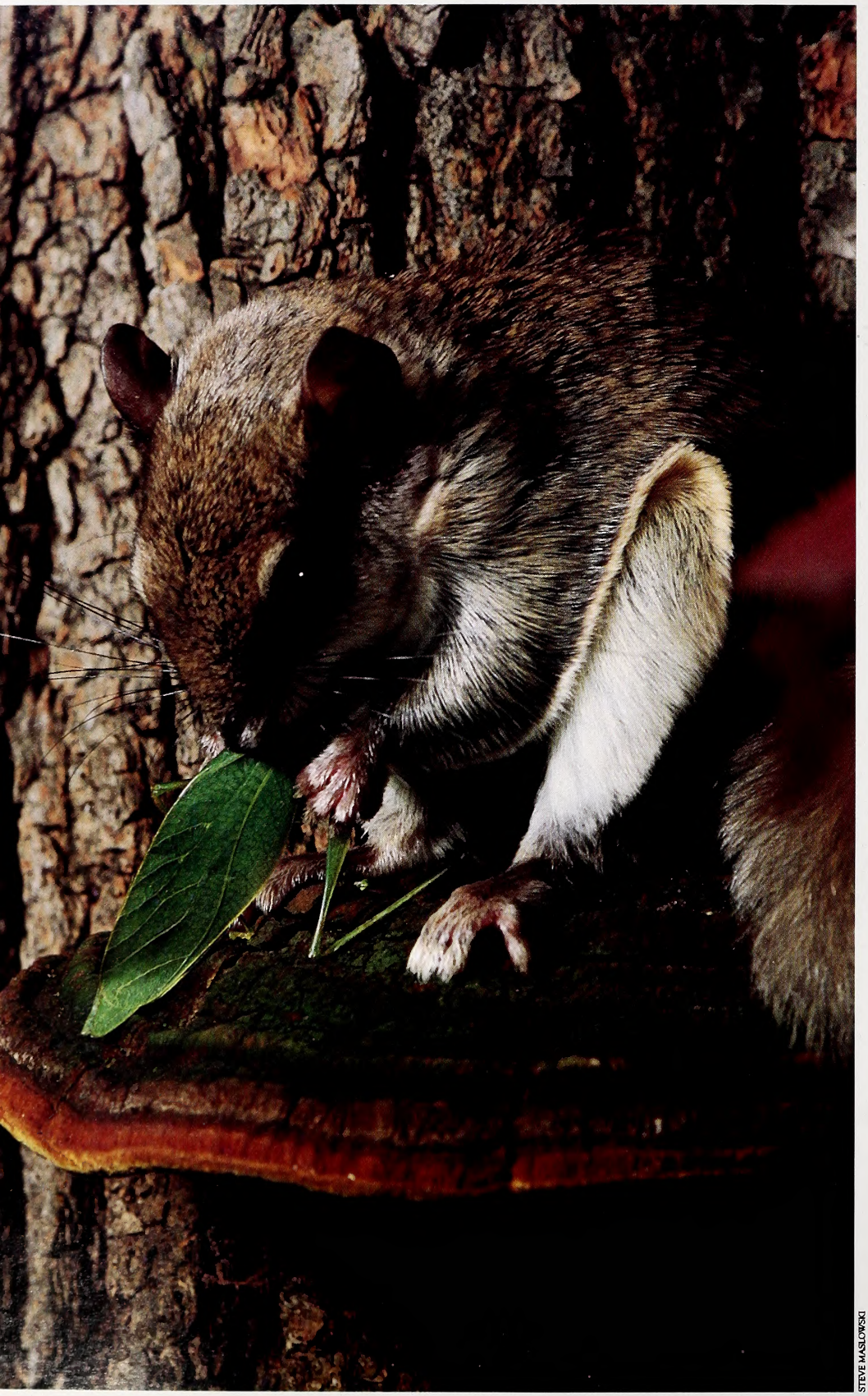
In the bright light of day . . . *prothonotary warblers, dragonflies and wild turkeys* rely on eyesight to hunt and thus tend to be active during the day. Turkeys have to see bright-colored fruits to eat them. *Black bears* may change their activity patterns from season to season. *Weasels* and *minks* are active day and night.



In the deepest, darkest night . . . *barred owls*, *big brown bats*, *raccoons*, *opossums* and *millipedes* are abroad. Moths, which we normally think of as nocturnal, also include some diurnal species. On nights lit by a full moon, bats may return to their roosts and *wood ducks* may feed. *Frogs* mate and feed at night when temperatures are cooler and humidity is higher.

When They're Active. . .Showing approximate times of peak wildlife activity during the day.

DAY SHIFT NIGHT SHIFT



STEVE MASLOWSKI

***The southern flying squirrel** is a common species in North Carolina, yet it is nearly invisible because of its nocturnal habits. It only emerges after full darkness, and it is adapted to glide for 20 to 30 feet with the aid of a wing-like membrane.*

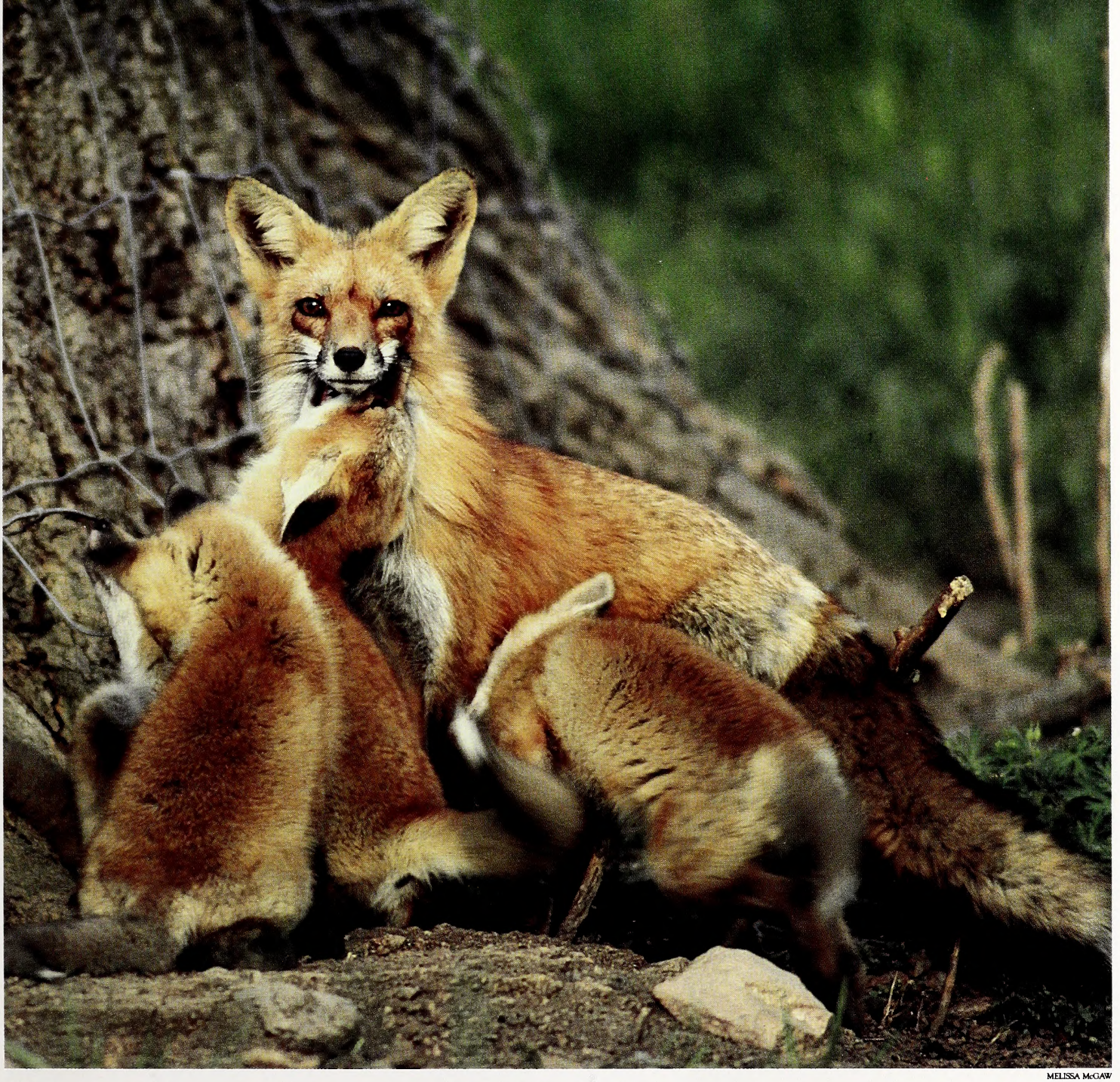
their heightened senses. Most bird species, lacking adaptations for night vision, keen hearing or echolocation, rely on sight to procure food. These species reduce the risk of becoming prey by being inactive at night.

Yet many animals don't follow the "rules." Indeed, very few animals are diurnal or nocturnal all of the time. The best you can say about them is that they are "primarily" nocturnal or "mostly" diurnal. Many species are active only at sunrise and sunset, for example. As these twilight periods are neither day nor night, the term "crepuscular" is used to describe animals active at these times.

Many mammals tend to be crepuscular. The white-tailed deer, under normal circumstance, is considered to be a crepuscular species. Of course anyone who drives much in North Carolina has seen deer at any hour of the day or night standing around the edges of fields. A deer must obtain food in the most efficient way it can. This means that it must find the right kinds of food in the right amounts while minimizing energy expended to avoid predators, including humans. Thus in places where it is likely to run into humans, deer may be active at night, while in bottomland hardwood forests, where humans are not present often, deer may be more crepuscular or even diurnal. Deer activity patterns become even more complicated when dimensions such as weather disturbances are factored into the daily cycle.

Similar patterns are noticeable in other mammals. The bobcat, fox, coyote and wolf are considered primarily crepuscular. Carnivores must obtain food with the least expense of energy. They must be careful to avoid using more energy hunting or escaping from humans than they would get from their prey. Thus many mammalian predators respond to human disturbances by shifting to nocturnal activity patterns. In fact, some evidence is beginning to suggest that mammals such as the wolf and black bear may prefer a diurnal activity pattern but are forced to be crepuscular or nocturnal to reduce interaction with humans.

Some animals are neither diurnal, nocturnal or crepuscular. For example, shrews



MELISSA McGAW

***Red foxes can be active** during the day, especially during the breeding season when there are pups to be fed. This vixen has just returned to her den after a hunting trip.*

feed throughout a 24-hour cycle because they have a very high metabolic rate. The river otter, mink and weasel also have metabolic rates that require frequent foraging for food. They may be observed during any hour of the day or night as they must go through more activity cycles to maintain themselves. Mammals are clearly more flexible than other animals and can time their activity to periods when food is available or predators are not.

The activity cycles of reptiles and amphibians are driven by different concerns. During cold or hot weather these cold-blooded animals must seek refuge from temperature extremes in order to survive. When you see a turtle, snake or alligator basking in the sun, they are often regulating their body temperatures. During the heat of the day, many of these species will hide under logs or in stumps to cool off. During cold weather, they hibernate. Some reptiles are clearly diurnal. Snakes such as the black racer and coachwhip have adaptations such as the size and color of their eyes that make it practical for them to forage during daylight. Pit vipers tend to be crepuscular or nocturnal and some species such as the rat snake are primarily nocturnal because of prey activity and availability.

On the other hand amphibians are largely nocturnal because of their need to avoid predators, to lower body temperature and to retain a moist environment. Frogs mostly mate at night. Mating calls may be heard during daylight to some extent, but most are heard at night.

Like other groups of animals, fish are both nocturnal and diurnal. For example, deep-sea species often move near the surface at night. This could be a response to light or to the movements of their principal food. Plankton, an important food item for many ocean fish, moves down in the water column during the day and up at night. Night feeding may also

DAY SHIFT NIGHT SHIFT

JACK DERMID

Night creatures both, *the chicken turtle and white-footed mouse occupy different habitats, but are active mostly after dark. The chicken turtle is nocturnal especially in warmer weather. Not all turtles are nocturnal feeders. Many pond turtles feed more during daylight hours.*

JACK DERMID

be a behavior that reduces the risk of being eaten by some other ocean dweller. Fish that feed at the ocean's surface have vision adapted to a diurnal activity cycle.

Many freshwater fish have similar patterns. Catfish have sensitive barbels around their mouths that enable them to forage in murky waters day or night. In contrast, sunfish are primarily visual hunters and forage mostly during daylight hours. Yet many freshwater fish will also feed at night—crappies and walleye being two examples—and the largemouth bass (a member of the sunfish family) may also end up on a night fisherman's line.

After contemplating the differences between nocturnal, diurnal and crepuscular species for most of the morning, I decided it was time to begin my own diurnal foraging cycle. My food was in my vehicle about a mile away. Since it didn't appear that either of the gobblers I had heard earlier was interested in my calling, I stood up. Immediately there was a loud *Putt! Putt!* about 15 yards behind me. I turned to watch a very large gobbler run like a race horse down the creek bank.

Oh well, the morning wasn't a total loss. In some small way, I had grown professionally through my morning's thought processes even if I hadn't put food on the table. My day shift was well-advanced, and the night was still far away. Yet I also knew that, like many creatures, my activity cycles and feeding habits could not be easily categorized. How else to explain why a diurnal human would stay up all night watching old movies on TV while eating potato chips? ☐

Dennis Stewart is habitat conservation program manager within the Division of Boating and Inland Fisheries. The program promotes the conservation and protection of fish and wildlife habitat through environmental reviews.

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EUGENE HESTER

Serious About Squirrels

Technology and tactics for the squirrel hunter who is weary of being outsmarted by bushytails.

by Eddie Nickens ©1993

There was a squirrel up there, that much I knew. For nearly half an hour, tiny chips of acorn shell had rained down on the dry forest floor, an almost imperceptible *chk-chk* like the falling of leaden snow. I'd scanned the trees with binoculars, scope and my naked eyes until my head throbbed, but not a hair showed. Now the woods were turning to shadow, my hunting buddy was calling from a far-off ridge and my options were running out.

Then I remembered a high school hunting pal who ran screaming through the woods like a Rebel each time he caught a squirrel. The bushytail, no doubt shocked by such devilish behavior, would often freeze on the tree, wondering what in the world was going on. A shotgun blast often answered the question.

If running through the woods yelling anchored moving squirrels, I thought, maybe a similar tactic would get my invisible target to show itself. I held my rifle high and made a noisy, 10-foot sprint to a nearby tree. In response, the squirrel bolted, dashing across

Curious, but alert, *this gray squirrel isn't likely to give a hunter such an inviting target for very long. Gathering the principal ingredient for real Brunswick stew requires refined tactics.*

***To bag squirrels** consistently with a rifle, an accurate .22—preferably a bolt action—and a good quality variable scope are essential. Various squirrel calls and a portable tripod for support when making long shots can also help. Squirrel hunters are also legally required to wear blaze orange.*

a limb, silhouetted against the darkening sky. I immediately blew a shrill blast on a Mr. Squirrel call I keep in my mouth while hunting, and the thoroughly confused squirrel skidded to a stop. When the crosshairs settled just below the ears, I squeezed.

Ten years ago, I'd never have bagged that last-light squirrel. My ancient J. C. Higgins autoloader was up to the task, but not the sorry $10 scope that rode the receiver. I'd have gotten precious little help, as well, from the only calls I used to carry: two quarters whose ridges I rubbed together in an attempt to imitate a squirrel cutting an acorn.

But all things evolve. This year I'm taking to the squirrel woods with a Remington 541-THB target rifle with a heavy bull barrel, piggybacked with a 3X-9X Bushnell scope with a 32mm adjustable objective lens. My fanny pack will bulge with a set of breakdown aluminum cross sticks, three squirrel calls, a face net and camo gloves. Call me a gadgethead if you like, but one thing's for sure: hunt my way, and eight times out of 10 you'll leave the woods with more Brunswick stew-on-the-hoof than ever before.

The first step toward becoming a serious—and seriously successful—squirrel hunter is to upgrade your armaments. Moving from childhood peashooter to serious rimfire steel is akin to Og taking his first few steps in an upright position. Until prehistoric man learned to walk, there was no way he could ever drive a Maserati.

A few years ago I traded up to a Remington autoloading .22 topped with a decent scope. For five years I was a happy hunter, but I knew there was room for further evolution. The gun boasted 17 Long Rifle cartridges lined up in the tube like torpedoes, but I never needed 17 shells to bring down a squirrel, and never cared for scattering 17 bullets through the woods after a bushytail burning rubber through the treetops. I began thinking critically. With a bolt gun, I figured, I could add 30 yards to my effective range. With a few fine-tuning adjustments to my hunting strategy, I'd easily double my bag.

After researching the market and consulting with my armaments acquisition team co-leader, who happens to be my wife, I decided I didn't really need a $1,200 custom Anschutz 1700. I learned that I didn't have to dip into

MELISSA McGAW

our retirement fund to purchase the proverbial tack-driver. New .22 rifles capable of 50-yard groups in the 10-ring can be had off the shelf for less than $400; some models cost far less. Guns in this class include bolt-action rifles such as the Remington 541-T, Browning A-bolt, Marlin 880 and Ruger 77/22. There are rimfire repeaters capable of handling the job of long-distance and no-excuses squirrel hunting, but bolt guns, simply by design, are more accurate.

But these guns are merely *capable* of serious shooting. Making sure they perform that way is up to the shooter. Perhaps the biggest mistake squirrel hunters make relates to the choice of sights for a rimfire, particularly scopes. Cheap, 3/4-inch tubes are worthless for squirrel hunting during the first and last 45 minutes of legal light, and they've caused more than a few hunters to miss the most active period of the day. Fine .22 scopes with 1-inch tubes and 20 to 32mm objectives can be had for $40 or so, and superlative tubes are available for twice that price, still well within the parameters of fiscal responsibility.

Even so, too many hunters waste their technology on a slack method of sighting in. After slipping a .22 scope into its dovetail mounts and zeroing with the aid of a nearby tin can, too many gunners think it's time to go hunting. But consider your target: The cranium of a gray squirrel is about the size of an avocado nut—which is every bit as small as it sounds. "Close enough" generally isn't. Once you own a small-bore rifle with big bore performance, wring every bit of accuracy from your investment. If you don't, you might have an experience similar to mine two years ago.

I met a college buddy one morning for a late-season squirrel hunt several hours from my home, and we decided to share a stand under one large tree. After an hour of whispering stories about the old days, a single gray squirrel started scampering toward us. It was a classic scenario—the squirrel crept closer and closer, never stopping for a clean shot until it was a mere 15 feet away. My buddy had already eased his Remington pump rimfire into position, so he squeezed off a shot at can't-miss range. The squirrel turned 180 degrees and streaked away, no doubt sporting a nice hair part from the shock wave of 40 grams of lead whistling overhead.

After good-natured ribbing I asked my friend what kind of ammo he was using. He pulled out a smorgasbord of high-velocity long rifles and longs in both hollow-point and solid configurations. "No wonder you missed," I said. "Some of those things probably predate smokeless powder!" His reply was a weak defense. "Oh, it doesn't matter," he said. "They're all just bullets."

Well, that's true, but a host of new .22 cartridges have entered the market during the last few years, and rimfire bullets these days differ dramatically in bullet weight, shape, powder makeup and burn time, all of which affect impact area and bullet behavior at the target. In the recent edition of Jim Lachuk's *Complete Book of the .22 Rimfire*, the author's extensive ballistic tests proved that any gun will shoot particular brands and configurations of cartridges better than others.

Take my new rifle setup, for example. In ballistic tests of a Remington 541-T, Lachuk reports that Federal Gold Medal ammunition with a 40-grain solid point punched 25-yard groups a mere 0.37 inches in diameter. On the other end of the scale, firing CCI Stingers with a 32-grain hollow point, groups ran 0.94 inches, more than twice than size of the Gold Medal groups. This doesn't mean that Stingers are an ineffective load, only that other loads performed more consistently in Lachuk's Remington.

EDDIE NICKENS

Hunters look for *hickory nuts and acorns that have been "cut" (gnawed) by squirrels. A hillside with mature oaks and hickories is almost always a good spot to hunt bushytails.*

Test groups from other rifles with a wide range of ammunition varied by as much as 2 inches and more. At 25 yards, that means you could miss half your squirrels. At 50 yards, you might as well be throwing rocks. There's little excuse for not test-firing several ammunition brands with a new rimfire. The cartridges are inexpensive, and since when was target shooting a bore?

With such an outfit in hand, you're halfway along your evolution as a serious small-game predator. All you need now is some kind of steadying apparatus. For years I used a telescoping camera monopod camouflaged with black paint and camo tape. When I slipped a shotgun sling around the monopod I had a highly portable and very stable shooting stick. But there was still room for improvement. I'd already decided to fashion a set of cross sticks out of old tent poles when I saw an article about a set of aluminum, breakdown cross sticks made by Mocksville's own John Underwood. The three-piece shockcorded tubes are only 13 inches long when folded up, but extend to form a solid 36-inch rifle rest. Now, any squirrel that ventures within 75 yards of my stand is taking a gamble. The only trick left is to maximize the number of bushytails that blunder into that deadly circle, and that requires an even higher degree of predatory evolution—squirrel calls.

Not all calls work, and not even the best work all the time, but a properly used call can work wonders in the field. Even my most

EUGENE HESTER

***If a squirrel** is hiding on the other side of a tree, it will often peek to see what's happening if you provoke curiosity with a squirrel call (above). You'll need to wear blaze orange to be legal while hunting squirrels nowadays, but you can still duplicate the results Bill Hinnant enjoyed on this hunt (right) photographed before blaze orange became mandatory.*

diehard hunting pals snicker at my squirrel call lanyard, festooned with a motley assortment of wood, plastic, metal and rubber calls, but I'll stand by my mania. I've been proven right too many times.

Most hunters with more than a passing interest in squirrel hunting have tried the popular bellows-type bark call. Tap the rubber bellows on one end of the call and a squirrelish bark comes out the other. A series of taps produces a chatter, and when I slap dry leaves with a branch in imitation of a squirrel hopping about in search of acorns, I have drawn targets out of the treetops. To calm squirrels after a shot, I've used a bellows call to duplicate the chatter of a contented squirrel, but I'm still not sure if the call works or if the squirrels just forget about the ruckus and continue feeding.

I've had greater success with the cutter calls, and I count on them to placate agitated squirrels after I've shot a few times. But my favorite squirrel call is used not so much to attract squirrels as it is to make them freeze in place and offer me a stone-still target. In fact, my very first squirrel of last year's season fell to this trick, one of my favorites. I'd hunkered down against a beech tree and remained motionless and quiet for 45 minutes when I saw a furry hump on a distant oak moving down the tree bole. I could just barely make out a few hairs of the squirrel through my scope, and I knew that as soon as it hit the ground it would likely take off running, most likely in the opposite direction. I settled the crosshairs where I thought the squirrel's eyes might appear from behind the tree, and then inhaled on the Mr. Squirrel call that I hold in my mouth—a round metal disk that squeaks the distress call of a young squirrel. Instantly the squirrel froze on the tree trunk. Another short squeak and a wide-eyed knot appeared on the edge of the tree. That was all I needed to see in order to squeeze off a good shot.

That distress call has become my favorite trick. Squirrels have a maddening habit of hopping, skipping and jumping from 100 yards away to right under my nose, never stopping long enough for me to squeeze off a clear shot. Before I can will myself to pull the trigger, they've hopped behind trees and skirted bushes until they reappear out of range. But with the distress call, a short, shrill whistle makes the squirrels stop on a dime, often even standing up to scan the woods for the source of the noise. It's hard to miss such a target.

Recently a friend of mine passed along a cassette tape that opened my eyes to the possibilities of yet another step in advanced squirrel hunting. In the hardwoods of the Mississippi River area, squirrel hunters use the distress call as part of an intricate calling tactic. Once they settle against a tree trunk and let the woods become quiet, they'll bear down on the distress call in a series of long shrieks, all the while beating tree limbs and saplings in the ground. The idea is to simulate the ruckus made when a hawk, owl or fox grabs a young squirrel in a death grip. Supposedly other squirrels will rush to the scene, chattering loudly in an attempt to scare off the offender.

I haven't tried it yet, but only because the season hasn't opened. This October if you see a fellow in head-to-toe camo carrying a rifle designed to shoot the fleas off a tick's back, thrashing saplings and squeaking like a tiny train, it's only me. Evolving. ☒

The Serpent & the Egg

It was a good egg, but not a great egg.

by Doug Elliott ©1993

"A little piece of paradise"—that's what my wife, Yanna, and I call our little homestead on the southeastern edge of the Blue Ridge Mountains. Along with our ponds, we have a small orchard and a large organic garden. Of course, it wouldn't be paradise without a serpent or two. And we do have serpents! This place is downright snaky! "Some of 'em are big enough to put side-saddles on!" one of the local old-timers told us. Our area is home to at least 20 kinds of nonpoisonous snakes—not to mention the occasional copperhead or rattlesnake.

One of our neighbors recommended that we put out "snake boards" to monitor the population. Snake boards are pieces of board, plywood, paneling, or sheet metal, scattered around the edge of our garden and in the orchard. Each piece is raised a few inches, propped up on a few rocks or a piece of two-by-four. These create an ideal habitat for snakes. It is warm, dry, dark and protected—and it attracts rodents, which snakes like to eat.

Every now and then, we check the boards. If there are copperheads around, I want to know about it, and we dispose of them in various ways. The nonpoisonous snakes we enjoy and want to encourage. Not only are they beautiful but they help control the many mice, voles and other hungry rodents that reside in our house, garden and chicken coop. Over the last few years we have found king snakes, mole snakes, racers, garter snakes, water snakes and corn snakes under our boards.

When I lifted one of the boards early this summer, I was amazed and pleased to find not one, but two large black rat snakes. These are one of the largest and most handsome of our nonpoisonous snakes. Seeing these glistening, heavy-bodied reptiles coiled under this board was like the answer to a snake boy's dream. Each of these was at least 6 feet in length. I very gently lowered the board. I felt honored to have them in the area and wanted to disturb them as little as possible. One of them had recently eaten a meal. We could tell by the bulge in its body. Could it have been one of those pesky voles that had been ravaging the potatoes? This was a big lump. . .maybe it had eaten the rat that had been hanging around the chicken coop. There was no way of telling for sure. We were glad they were there and we were thrilled that they were eating our rodents. I knew from observing captive snakes that a large meal such as the one this snake had swallowed can take as long as a week to digest. During this process the snake retreats to a secluded place, where it can rest and not have to move its distended body. That's just what this snake was doing.

Every day we would go out and gently lift the board, just enough to check on them. Whenever friends visited, we took them over to see "our" snakes. They were an awesome sight indeed, as they raised their heads and calmly peered out at us. Their tongues flickered curiously above the sprawl of glistening black coils. We always noted the bulge in the one snake's body. It seemed that even after a week the lump was still the same size.

One morning, our friend T. J. was visiting. T. J. is an older woman, a city apartment dweller who visits us regularly. She wanted to see the snakes, so right after breakfast we went out to the board. On the way, as we passed the chicken coop, we were telling her that when we had gotten the chickens the month before, we placed a fake plastic egg in the nesting box as a "nest egg," to encourage the hens to lay there. It was strange, we told her, how the egg had simply disappeared. We couldn't find it anywhere, even when we cleaned out the coop.

"The snake ate it," she said with conviction.

"No!" I protested, not even wanting to consider such weirdness in my own backyard. "A snake wouldn't be stupid enough to swallow a plastic egg. . .would it?"

"A chicken's stupid enough to sit on a plastic egg," she retorted. "Why wouldn't a snake swallow one?"

When we lifted the board, that was all the proof T. J. needed. "There's your egg in that snake," she concluded.

I gently lowered the board, still not wanting to accept what was becoming increasingly obvious. It had been weeks since the plastic egg had disappeared. I hated to consider the distress of this unfortunate instinct-bound creature suffering from this Grade A hunk of plastic lodged in its gut. Nor did I want to consider the additional suffering I would cause if I made some clumsy attempt at surgery.

"We've got to catch that snake and do something!" both she and Yanna insisted.

Procrastination was doing no good. I knew I had to act. I went back and captured the snake. Often a wild snake will struggle or strike defensively when first caught, but this snake was as gentle as could be. I felt the lump in the snake's body. This was no half-digested rodent—it was exactly the size and shape of our missing plastic hen's egg. We measured the snake. It was 6 feet long. The egg was lodged 32 inches from the head—almost halfway down the snake.

What to do? Surgery? How would I cut it open? If I did cut it open, how would I sew it back up? My mind raced ahead trying to think of a solution.

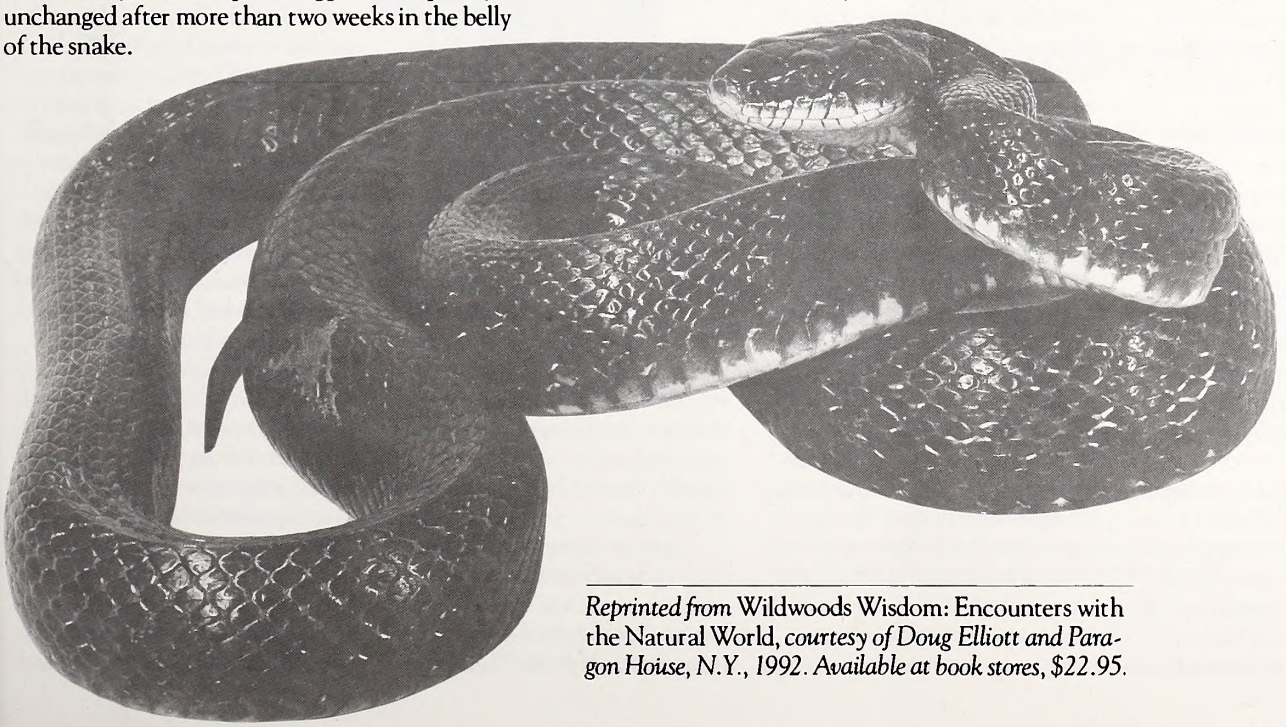
"I have an idea," I said and started gently squeezing behind the egg. The snake writhed about in my hands (but never attempted to bite). Could it be? The egg was responding to the pressure. It was moving! Soon Yanna was in there with me. We just kept cradling the snake in our arms and gently squeezing its body behind the egg, forcing it slowly forward inside the snake. Inch by inch, the egg was moving forward. As the egg approached the last foot or so, the snake's own peristalsis took over and the snake continued the process on its own. We held the snake and watched in awe as the lump continued toward the neck. The snake's head hung limply forward. Its mouth was open, and it drooled viscous saliva while making a soft-toned gagging noise. In a few minutes the egg appeared in the snake's greatly distended mouth. The snake gave one final flick of its head and the egg dropped to the ground. The snake appeared weak and exhausted. We felt that way, too. The plastic egg was completely unchanged after more than two weeks in the belly of the snake.

We put the snake in a cage to rest and recover. It avidly drank water from a dish. The snake had gone for weeks without food and we knew that it was hungry. The next day we placed a fresh warm egg in with the snake, wondering how it would respond. Would it ever trust an egg again? Soon its tongue started flickering and, before long, it was wrapping its unhinged jaw around the egg and reversing the process we had witnessed a day before. It swallowed the egg whole. We watched the egg distend the neck as it moved down the snake. After the egg had traveled about six inches, it stopped. The snake flexed its body to make a right angle bend at the egg. Then we heard the muffled yet unmistakable sound of an egg cracking, and soon there was no longer any visible evidence of the meal the snake had just eaten.

It's hard to read a snake's expression, but something about its demeanor after this meal seemed to say, "Ahh, now, that's the way things are supposed to be."

We kept the snake a few more days, fed it a few more eggs, and then we released it.

A year later, I was walking by the garden. What should I see but a large black rat snake. I followed from a distance as it meandered across the garden with flickering tongue and graceful undulations. Just before it crawled off into a thicket I picked it up. It was so gentle, I felt sure it was the one I had helped the summer before. I brought it to the house and presented it with a fresh egg. To my astonishment, it took the egg right from my hand. We kept the snake for a few days more and fed it several more eggs. It would coil up on my lap and take eggs from my fingers. We released the snake, and we look forward to our next meeting. That plastic egg has become one of our treasured possessions. Sometimes it sits on our bookshelf, where it serves as a reminder that as much as we try to live in a harmonious way with the natural world, we've still got a lot to learn. Sometimes it travels with me in my storytelling bag as a reminder that, with nature as the source, the stories will never end. ☐



Reprinted from Wildwoods Wisdom: Encounters with the Natural World, *courtesy of Doug Elliott and Paragon House, N.Y., 1992. Available at book stores, $22.95.*

Magazine, Videos and Publications Take Home Nine

Wildlife Commission's Education Division Wins ACI Awards

Written and Edited by Vic Venters

The N.C. Wildlife Resources Commission's Division of Conservation Education was a big winner at this summer's awards ceremony for the Association for Conservation Information (ACI). *Wildlife in North Carolina* magazine received five awards, while the division's "North Carolina WILD" environmental education program took home four awards, bringing the number of awards won to nine .

The awards were announced at the ACI's annual summer meeting held this year in Portsmouth, N.H. ACI is an international organization made up of state, federal and provincial wildlife and natural resources agencies and other national wildlife conservation groups.

The Wildlife Commission's flagship publication, *Wildlife in North Carolina* magazine took the first place international award for best magazine. *Wildlife in North Carolina* also took a first place international award in the black-and-white photography category for "Workboat," a photo essay on coastal North Carolina workboats.

Three staff-written articles from *Wildlife in North Carolina* also won awards. "Echoes on Old Battlegrounds," dealing with Civil War battlefield preservation efforts, took an international third place in the magazine parks article category. "Hunting Ban Threatens Wildlife Refuges," a look at threats to national wildlife refuges from anti-hunting factions, took a third-place international award in the magazine wildlife article category. In the magazine general interest article category, "A London Best in Stedman," a look at flintlock gunsmith Michael Ehinger, took a third-place international award.

The "North Carolina WILD" environmental education program won two first-place awards, one second-place and one third-place award. In the subject series category, the Division's *Wildlife Profiles sets 1 & 2* took a first-place international award. The *Wildlife Profiles* are a series of educational fact sheets for students and teachers on the different wildlife species found in North Carolina. In the one-time publication category, *This Land is Sacred* teacher's guide also took a first-place international award. *This Land is Sacred* is an environmental education activities guide designed to encourage conservation and a responsible land ethic.

In the education category, *North Carolina WILD Notebook* took the second-place international award, while *All Things Are Connected* video took the third-place international award. *North Carolina WILD Notebook* is an environmental education primer produced monthly during the school year. This is the fifth consecutive year that *North Carolina WILD Notebook* has won either first or second place in ACI's education category. *All Things Are Connected* is a video based on an environmental ethics speech by Native American Chief Seattle.

"This recognition is especially meaningful and gratifying considering the very fine work being done by so many of the agencies and organizations across the country," said A. Sidney Baynes, chief of the Wildlife Commission's Division of Conservation Education. "The support provided by the Wildlife Commission and the Director's office, and the hard work and dedication of the Division staff are keeping the agency in a position of national leadership in the field of environmental education."

Lives Only in Mountains

New Appalachian Rabbit Species Identified

There's a new rabbit species wandering North Carolina's mountains these days. Make that newly *described* species, to be more precise.

The rabbit is the Appalachian cottontail (*Sylvilagus obscurus*), a species that for years was thought to be the same rabbit as the New England cottontail (*Sylvilagus transitionalis*). However, recent research has confirmed that the New England cottontail and the Appalachian cottontail are distinct species, reports Dr. Joseph A. Chapman, dean of the College of Natural Resources at Utah State University and a long-time researcher of New England cottontails.

Chapman and three other researchers, Kenneth Cramer, Nico Dippenaar and Terrence Robinson, published their findings in late 1992 in the scientific journal *Proceedings of the Biological Society of Washington*.

New England cottontails are found mostly in the dense woodland forests of the Northeast. They were also thought to live in

the Appalachians south to Alabama, primarily in forest and heath habitat, as holdover populations from the last Ice Age when the climate was much cooler and the species more widespread. The researchers discovered, however, that two species exist instead of one, each geographically separated at the Hudson River Valley in New York.

Apparently, the two species evolved from a common rabbit ancestor sometime during the last Ice Age, when the populations were split in the Hudson Valley by glaciers. The New England cottontail is found north of the river valley, while the Appalachian cottontail ranges south from the Hudson.

Physically, the two species appear almost identical and can be distinguished from each other only by skull measurements and genetic testing. The Appalachian cottontail's skull is shorter and narrower than that of the New England cottontail. In North Carolina, the Appalachian cottontail also closely resembles the more common eastern cottontail of lower elevations.

Populations for the Appalachian cottontail appear healthy in its range in North and South Carolina, Georgia, Alabama, Virginia, West Virginia, Maryland and Pennsylvania. In North Carolina, the Appalachian cottontail is found only in the mountainous counties to the west. The New England cottontail, on the other hand, is declining in some areas of its range, possibly due to competition from cottontails introduced from the Midwest.

Application Deadline Oct. 29

Take Pride in America Contest

For the seventh year, North Carolina will participate in the Take Pride in America (TPIA) awards program for 1993. Take Pride in America is a statewide campaign to increase awareness of the need for wise use of natural and cultural resources, and to encourage a sense of stewardship and responsibility toward public lands through volunteerism.

The awards program recognizes outstanding volunteer stewardship efforts by individuals, groups and businesses on behalf of the state's natural and cultural resources. The awards program is open to individuals or groups. The activities for this awards cycle must have been initiated, accomplished or ongoing in 1992 and/or 1993.

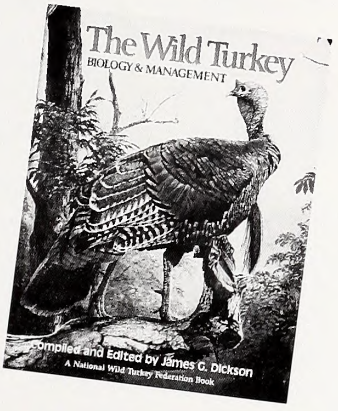
Completed nomination forms must be postmarked by Oct. 29, 1993. Nomination forms and TPIA information is available by contacting Take Pride in America, Division of Parks and Recreation, Archdale Building, P.O. Box 27687, Raleigh, N.C. 27611.

Book Review

The Wild Turkey: Biology and Management

The Wild Turkey: Biology and Management, *compiled and edited by Dr. James G. Dickson. Published by Stackpole Books. Hardcover, 463 pages, 1993, $59.95.*

The Wild Turkey: Biology and Management is the most complete book ever written on the subject. The book's 24 chapters were written by the leading wild turkey authorities in the world. Although many of the chapters deal with subjects that are technical in nature, this book was written in an easy-to-read style that will be useful to both hunters and professional biologists. The book brings up-to-date many findings from recent research and management activities, particularly those of the last 25 years.



The Wild Turkey is divided into four sections. The first section deals with the wild turkey and its genetic characteristics. The second section includes chapters on physical characteristics, behavior, foods and feeding, physiology, and population influences such as diseases, parasites, predators and the environment. The third section covers topics on habitat requirements and analysis, the different subspecies and wild turkey populations outside of their historic range. The last section also covers recreational use and the future of the wild turkey.

This book was a joint effort between the National Wild Turkey Federation and the USDA Forest Service and took 12 years of planning and work. In my opinion, it was worth the wait. *The Wild Turkey* should be a mandatory addition to the library of every serious wild turkey enthusiast. It is available through the publisher, Stackpole Books, or the National Wild Turkey Federation.

—Michael H. Seamster
Wild Turkey Project Leader

The 1994 North Carolina Wildlife Calendar Is Here!

***With such artwork** as Robert C. Flowers' "Family Outing" featured above, the North Carolina Wildlife Calendar is sure to sell out.*

The works of Robert C. Flowers, Jr., Dan Johnson, Ken Helser, Alan Cheek, Jake Taylor, Shannon Critcher Jones, Robert B. Dance, Bob Herr, Duane Raver, Mel Steele, James A. Brooks, and Dempsey Essick are featured in the 1994 Wildlife Calendar. Order yours today by returning the form below with your check or money order to 1994 Calendar, N.C. Wildlife Resources Commission, 512 N. Salisbury Street, Raleigh, N.C. 27604-1188.

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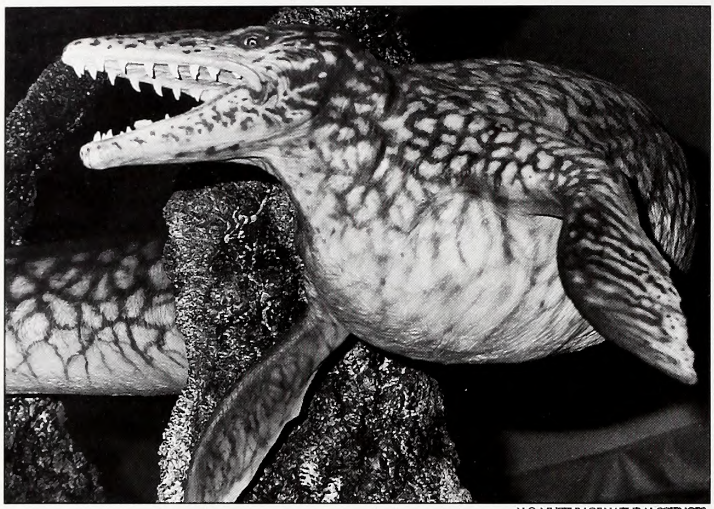
All orders must be prepaid. We do not bill. A $20.00 charge will be made on returned checks (N.C.G.S. 25-3-512).

For fund raising and bulk rate information (10 calendars or more), call 919-662-4377. Please allow 6 weeks for delivery.

CALO94

Exhibits Run Oct. 15-24

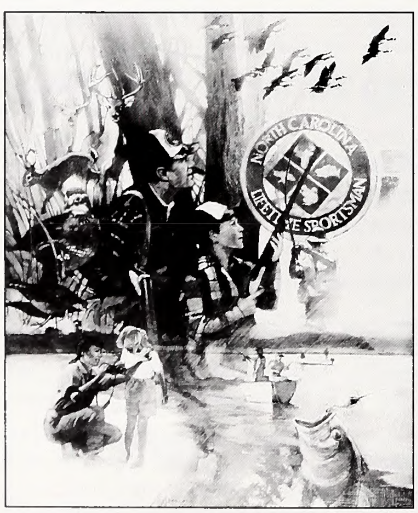
Prehistoric Creatures Return to State Fair



N.C. MUSEUM OF NATURAL SCIENCES

An exhibition of life-like *prehistoric marine creatures, such as the* Basilosaurus *pictured above, is sure to be one of the most popular attractions at this year's North Carolina State Fair in Raleigh in October. The exhibit of life-size and half-size marine mammals and reptiles is being sponsored by the North Carolina State Museum of Natural Sciences and the Friends of the Museum. Ticket discounts are available for school groups. For more information, contact the Museum at (919) 733-7450. While at the State Fair, don't forget to visit the Wildlife Resources Commission's booth featuring exhibits on public access to boating areas and gamelands.*

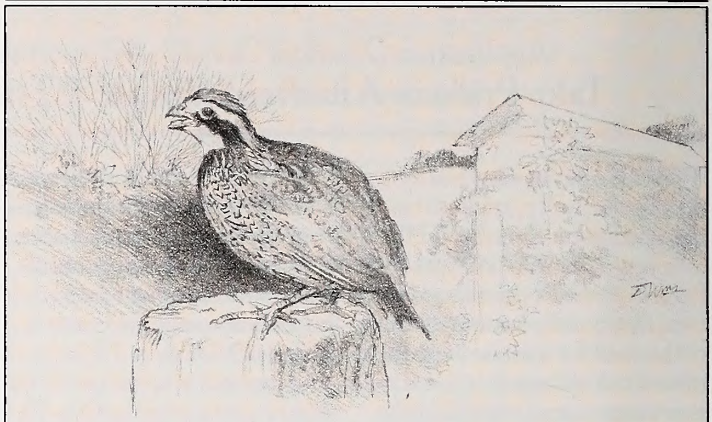
Wildlife Endowment Fund Report



July 1993

Principal Balance
$18,514,972.00
Interest Earned
$11,975,717.79
Total Receipts
$30,490,689.79
Interest Used
$5,175,203.48
Fund Balance
$25,315,486.31

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.



Cap Your Chimneys Now

by Vic Venters

Here at *Wildlife in North Carolina*, we spend a lot of time telling folks how to attract wildlife to their backyards or farms. But certain species aren't always welcome, especially when they show up in the wrong place at the wrong time.

Take chimneys, for instance. A variety of wildlife species will occupy chimneys. For raccoons, opossums, gray squirrels and flying squirrels, an unprotected chimney is seen as an open house invitation to set up a den. Cavity nesting birds—such as wood ducks, chimney swifts, and various woodpecker species—will also build nests in chimneys. Bats also use chimneys. Other times, mammals or birds simply fall in.

For the unfortunate animals, it often means death for those species trapped or unable to escape, especially in newer houses with slick flue liners. As for homeowners, the end results are often clogged, smoking chimneys, frightening noises at very odd hours, noxious odors from decaying animals, or expensive calls for professional pest removal. Home-remedy removal sometimes works for mammals, but if you've ever had a frightened, soot-covered squirrel or whacked-out raccoon loose in your house, you'll be able to write the book on ruining home interiors.

For this reason, fall is a good time to cover your chimneys with a fire-proof grate or chimney cap, available at most building supply stores or from urban wildlife specialists. This will keep mammals from selecting your chimney when they begin searching for denning sites for the winter.

Fall chimney capping is important when dealing with birds, because most songbirds are migratory, and are thus protected under state and federal law. Once they build a nest in your chimney, the birds, their hatchlings or the nest may not be legally disturbed until the birds leave the nest, which usually occurs in late summer. This rule also applies to capping, which is prohibited while the nest is occupied. For the most effective animal deterrence, always select a cap that completely encloses the chimney. Mammals like flying squirrels can often find their way through surprisingly small openings.

N.C. Wild Store

Take advantage of these great items and you'll support conservation education throughout North Carolina. Proceeds from the sale of these publications will support the development and production of educational projects and programs.

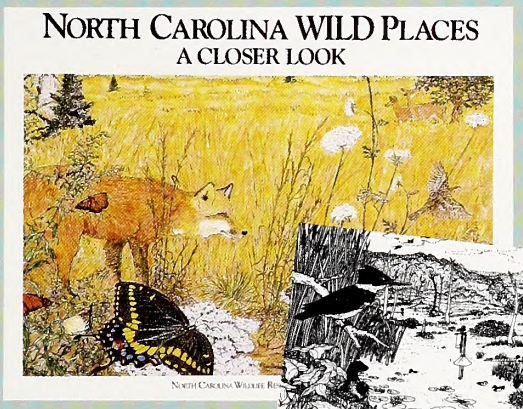
"North Carolina WILD Places will become a standard reference...The book combines accurate descriptions and illustrations in a way sure to attract both casual and serious readers. It really is a wonderful addition to the literature about the natural heritage of our state."

—Fred Beyer, Past President, N.C. Science Teachers Association

North Carolina WILD Places Map Print

Charming, signed limited-edition art print showing North Carolina's wild places as seen by artist Jackie Pittman. 1,000 limited-edition and 100 artist's proof prints. Also available as a poster. 36" x 24".

Item code **E2-4**



North Carolina WILD Places: A Closer Look

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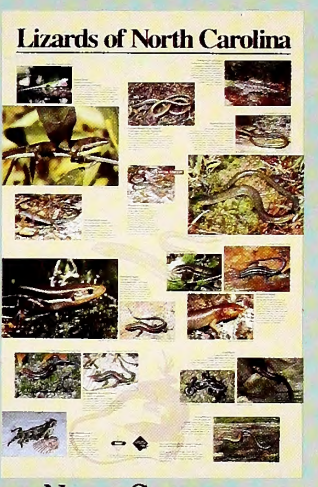

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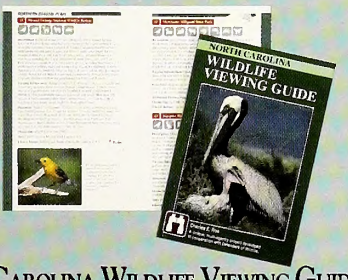

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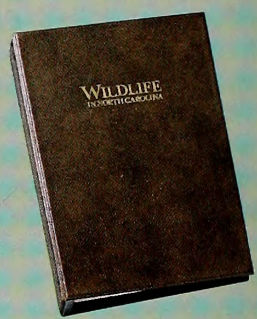

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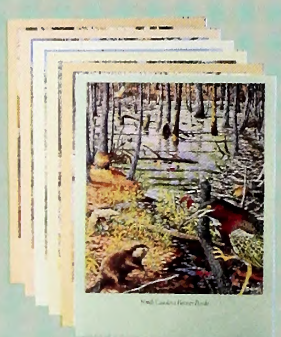

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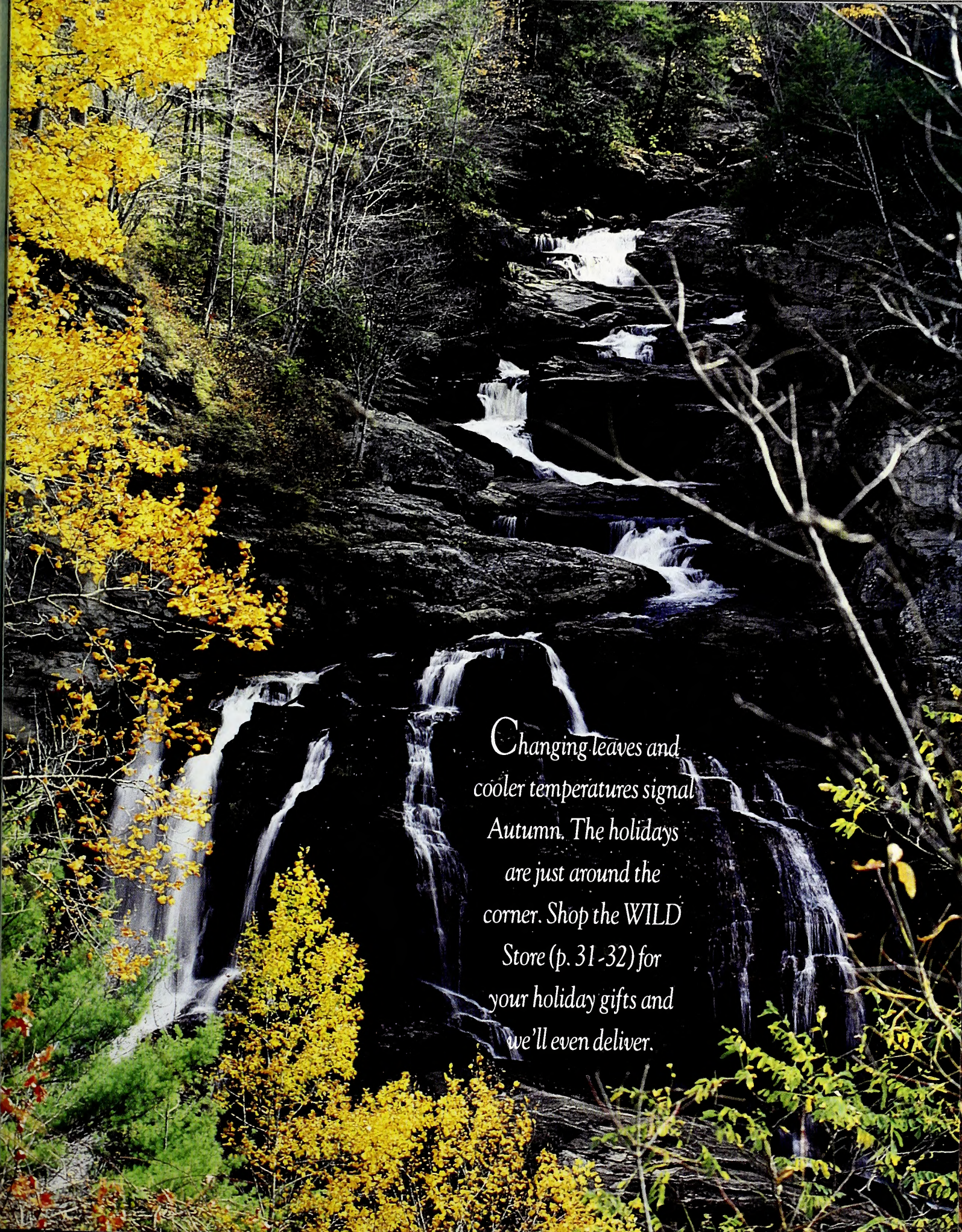
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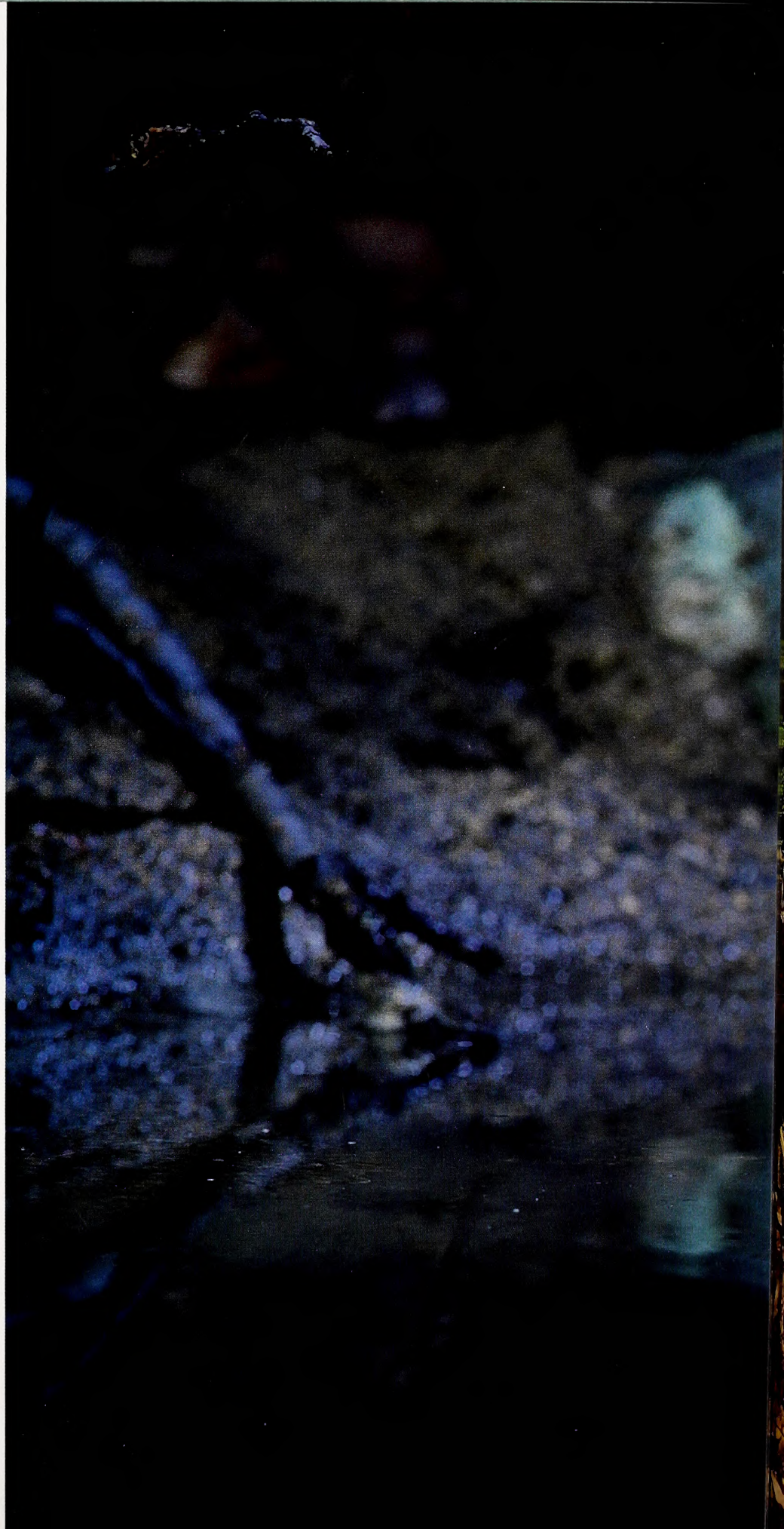

Surreptitious Sip

Though nocturnal and seldom seen, the southern flying squirrel is actually very common throughout much of North Carolina. Even in many cities, it glides through the treetops after dusk, and often raids bird feeders while we sleep. Its close kin, the northern flying squirrel, however, is found only in a few high mountain locations in the state.

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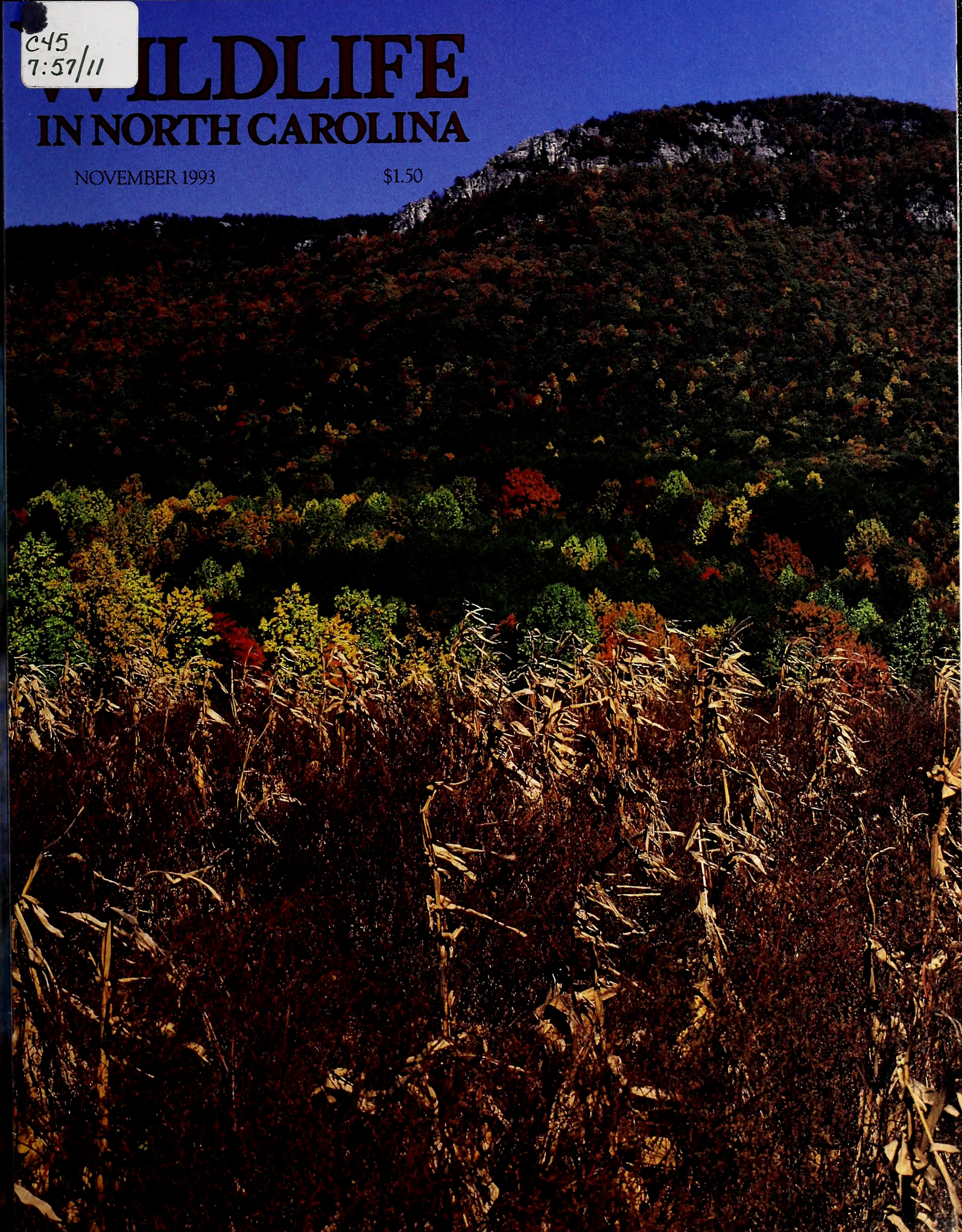
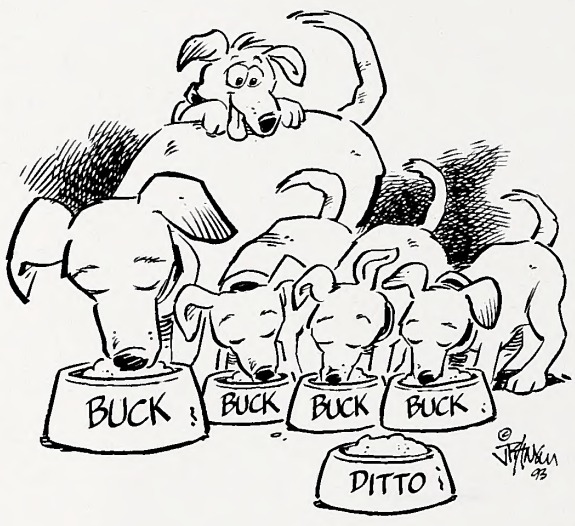


Calling All Dogs

by Jim Dean

When it came to naming dogs, my grandfather was of the practical persuasion. Since all his dogs were trained to hunt, point and retrieve bobwhite quail, he chose easily understood, one-syllable monikers. Frank and Mack were the first I remember. They were standard, business-model bird dogs that generally reflected the direct and honest qualities of their master. Because they had simple names, both the dogs and the owner could keep them straight.

But as the years have rolled by, there has been a steady succession of dogs. Chief followed Frank and Mack, then Sam took a brief turn. After my grandfather's death, Dad owned several dogs including Mack II and Buck, the original "pointer of no return." When Buck finally went to that great pea field in the sky, a puppy named Jake was already coming along nicely. All this while, we have also been hunting steadily with good friends who have likewise carried a line of one-syllable dogs who answer to names like Mutt, Pat and Meg.



ILLUSTRATED BY JACKIE PITTMAN

In the long run, we were undone by the rule of simplicity. It is easy enough for a dog named Buck to remember his name, but not so easy for his owners and handlers who have to sort through 40 years of dogs and two dozen similar names while bobwhites are blowing out wildly from underfoot and the monosyllabic dog of the moment is approaching orbit.

Far too often I have shouted "Mo Muck," when I really meant "Whoa Buck," Or Mack. Or Mutt. Needless to say, Muck never paid any attention whatsoever, and I can't say I blame him.

And so it was with considerable interest that I listened to Vic Venters report that a trainer of his acquaintance from Richlands names all of his female dogs Lady, and has done so for years.

"He never mangles a name or has to fumble through half a century of bloodlines to get to the right one," Vic explained. "And those dogs don't know whether the Lady being summoned is a daughter, sister or grandmother. They're all Ladies."

It makes perfect sense to me, and it is not without precedent. Former heavyweight champ George Foreman has named all his sons George. Still, I have heard of yet another gentlemen who has devised an even better system. Every living creature on his place is named Buck. All his dogs are named Buck. His wife is named Buck. His sons and daughters are named Buck. His mules—both Buck (no doubt). His cows, hogs, goats, and chickens all answer to Buck. When someone asked him why he had gone to such extremes, he was quick to answer.

"Because, by gum," he said, "when I call, I want something to come a-running."

Not everyone seeks simplicity in naming a dog, and that certainly applies to line-bred field trial dogs. Some titles string together more heirloom family cognomens than the last seed of Virginia aristocracy. Champion Mississippi Zev and Champion Johnny Crockett are among the most celebrated field trial bird dogs of all time, but while their performances on the ground might be unmatched, their names are somewhat pedestrian compared to many other trial dogs. I once saw a dog named Hightone's Rapid Rip run in a local trial, and thought it carried an inspired arrangement of appellations. Who among us has not called that dog a time or two?

Nor are English pointers and setters the only canines who sport extended, weighty titles. In a recent beagle trial magazine, I noted dogs with such names as Gundog Allen's Boogy-Woogy Banjo, Daniel's Cane Cutter Cody and Bryson's Swamp Creek Buzz Boy. Of course, such titles usually denote lineage, and handlers adopt shorter nicknames to handle packs of beagles in the field. Imagine the confusion if full names were required. It would take a week to get all the tangs untongled.

Of course, those of us who also own countless pets, mixed-breed mutts and hearth-bound gundogs aren't always governed by hunting tradition or lineage. We more often pick names based on whimsey. Among our office staff, there are dogs named Muldoon, Watson, Weenie and Manfred, although there is one Rover (a few fierce traditionalists remain). But I haven't run across a dog named Spot in years, and one recent poll notes that Pepper is now the most popular name for a dog. We once owned a shorthair appropriately named Pepper because of its densely speckled color, but some people apply the same name to pure white poodles. White Pepper? Is there such a thing as a politically-correct dog?

Which reminds me that I once acquired part ownership of a poodle in a package deal. A more miserably neurotic dog never lived, but I think I know why. How would you like to go through puppyhood with a name like Dior? If it had been left up to me, I'd have called him Buck.

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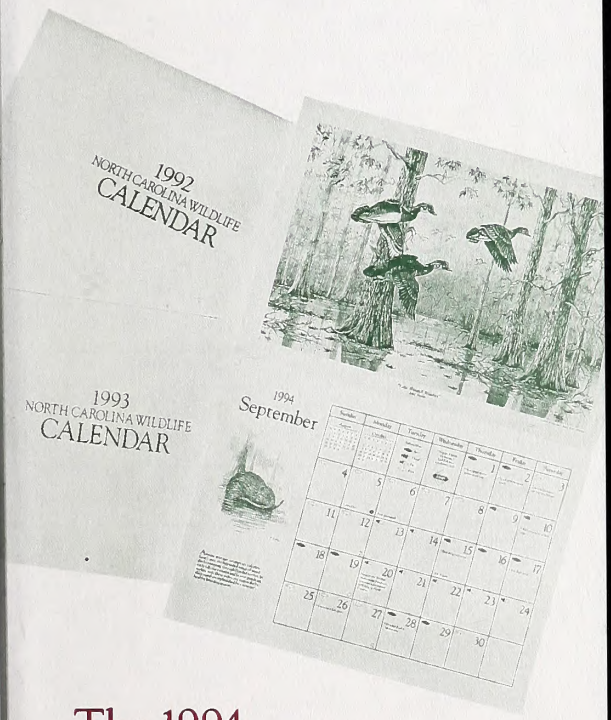

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and also to the environment we share with them.

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26 **Squirrel Wars** *written by Warren Dixon, Jr.* ©1993
illustrated by Jackie Pittman ©1993
Surrounded and vastly outnumbered, our intrepid commander in the Battle of the Bushytails wins lasting fame with his terse response to the demand that he surrender. "Nuts!" says he.

DEPARTMENTS

Our Natural Heritage *by Jim Dean*

Nature's Ways *by Lawrence S. Earley*

Back of the Book *by Vic Venters*

Wildlife Through the Year *by Vic Venters*

Cover *Late fall lingers in the Sauratown Mountains on a blazing Indian summer day. Might there be a covey of bobwhites somewhere nearby? Photographed by Ken Taylor.*

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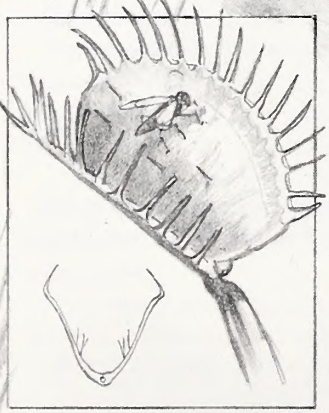
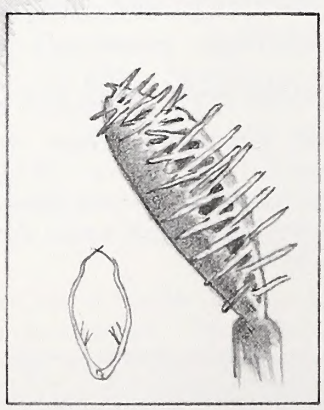
The strange and deadly *Venus's-flytrap is murder on insects. Like other carnivorous plants growing in soils lacking in essential nutrients, the fly-trap takes advantage of the nutrients in plentiful insect bodies by capturing and digesting them.*

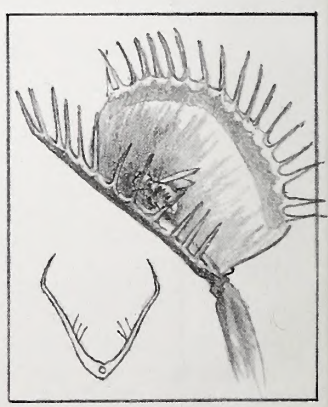


The trap consists of *a narrow leaf that broadens into two lobes. Three trigger hairs grow on each lobe. The lobes are spread at first, enabling a fly, wasp or beetle to land.*



The trap is sprung *when an insect strikes any one of the trigger hairs twice within about 40 seconds. The sprung trap closes rapidly—within a half second—imprisoning the insect.*

The two lobes *of the leaf press together enabling digestive fluids to work on the insect's body.*



Within a day or so, *the soft parts of the body are digested. The trap opens again in about 10 days.*

A Most Wonderful Plant

written by Lawrence S. Earley/illustrated by David Williams

The plant that Darwin called "one of the most wonderful in the world" isn't a showy orchid or a giant and colorful tropical bromeliad. Its flower is unimpressive, a wisp of white on a short stalk, and the plant itself skulks in low grass on wet ground where it is nearly undetectable when not in bloom. Yet the Venus's-flytrap has fascinated generations of scientists and amateurs alike.

The main reason, of course, has to do with what it eats, for this plant is one of very few that actually eats animals—principally ants, spiders, wasps and beetles—instead of the other way around. Darwin wrote an entire book about insectivorous plants, so it probably wasn't the flytrap's appetite that impressed him. What did impress him, and what continues to impress today, was the plant's sophisticated trap.

Growing from a bulb below the ground surface, the Venus's-flytrap consists of a number of narrow leaves that grow about 4 inches high, each of which broadens at the tip into two lobes that join at nearly a 90-degree angle. This is the trap. Fringing each lobe are from 14 to 21 teeth that interlock when the trap snaps shut. On the inside of each lobe are the trigger hairs, three elongated bristles per lobe, six in all.

A fly crawling around the interior of the trap will inevitably bump into one of the trigger hairs. A single bump does nothing. But if the hair is struck a second time within about 40 seconds, the trap snaps shut so quickly—usually in half a second—that the fly is imprisoned inside a cage with bars. The speed of the action mystified 19th-century scientists until they discovered that the signal between the trigger hairs and the trap mechanism was very much like the electrical impulses that activate animal muscle and nerve.

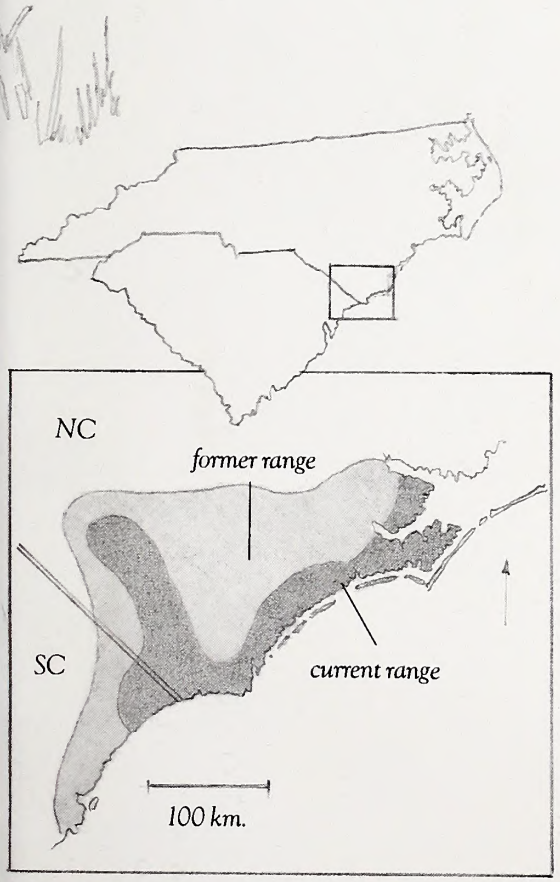
Because the flytrap is activated only after a second stimulus on any one of its six trigger hairs, some have said that the Venus's-flytrap not only has a memory, but knows how to count! Such a sophisticated mechanism normally prevents a raindrop or a fallen leaf from springing the trap.

But this is only the first stage of the sprung trap. The struggles of the insect inside the cage cause the two halves of the leaf to increase pressure on each other, forming a digestive cavity around the insect. Enzymes are introduced into the insect from glands on the inside of the lobes and for the next day or so, the flytrap digests the soft parts of the animal. When the trap opens again, in 10 days or so, only the hard parts of the insect's body will be left. The individual leaf trap can repeat this process several times before it finally dies.

Why have flytraps developed such an elaborate mechanism for trapping insects? Scientists know that the carnivorous appetite of plants arises in habitats where the soil lacks important plant nutrients such as nitrogen. Insect bodies are rich in mineral compounds that, when broken down during digestion, provide an alternative source of nitrogen for these plants. Thus, the Venus's-flytrap, like other carnivorous plants, relies on insects to make up for what it doesn't get from the soil.

The Venus's-flytrap is endemic to the Carolinas, growing nowhere else in the world but in a 75-mile radius around Wilmington, N.C. Beach development and road construction have whittled away at its restricted range, and poachers steal hundreds of thousands of the protected flytraps each year for the international black market.

If this process continues, the most wonderful plant in the world may one day be little more than a memory.

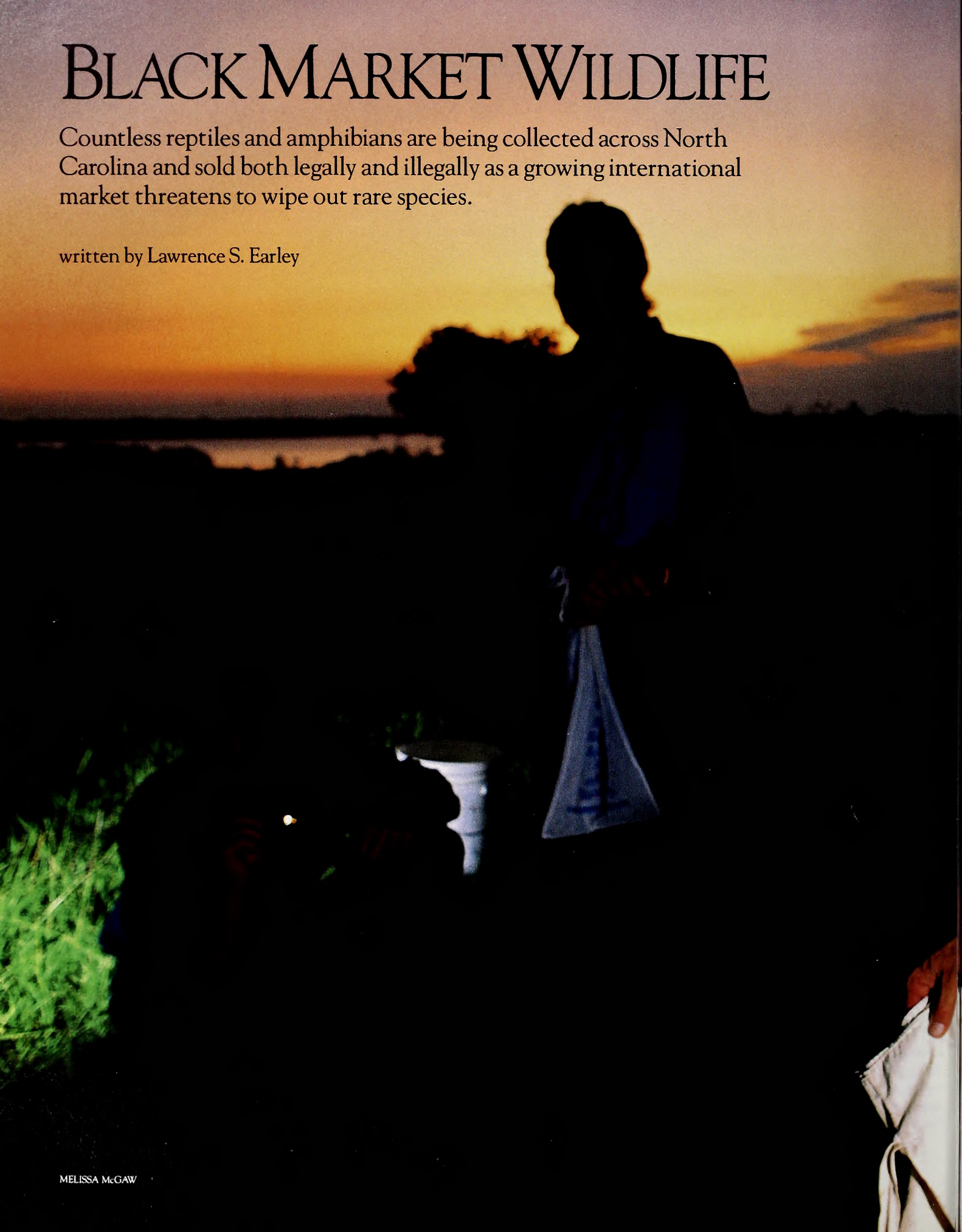


***Venus's-flytraps are** endemic to the Carolinas, growing nowhere else but in a 75-mile radius of Wilmington. Beach and highway development have reduced their historic range, and today poachers reduce their populations further by collecting specimens for an international black market.*

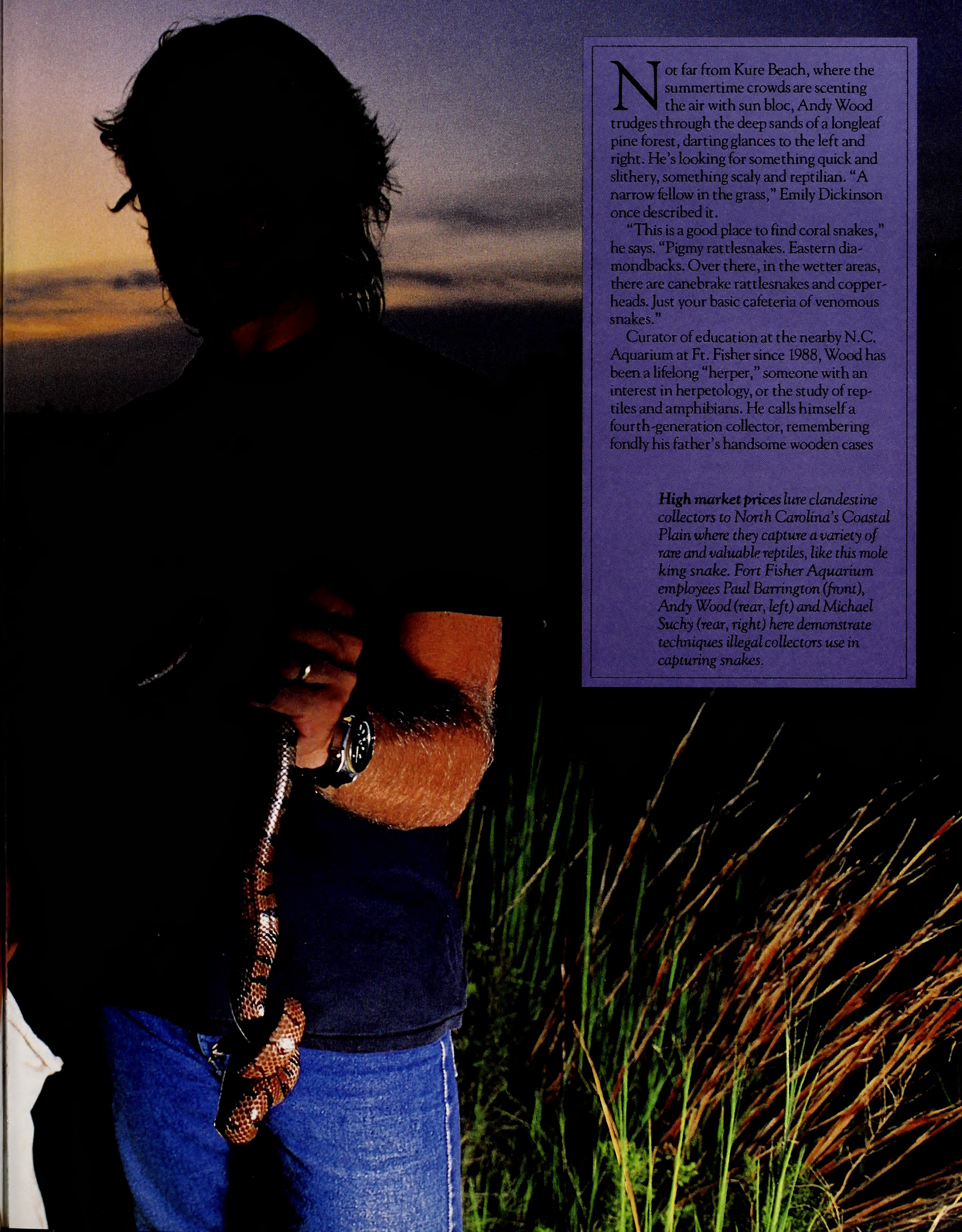
BLACK MARKET WILDLIFE

Countless reptiles and amphibians are being collected across North Carolina and sold both legally and illegally as a growing international market threatens to wipe out rare species.

written by Lawrence S. Earley



MELISSA McGAW



Not far from Kure Beach, where the summertime crowds are scenting the air with sun bloc, Andy Wood trudges through the deep sands of a longleaf pine forest, darting glances to the left and right. He's looking for something quick and slithery, something scaly and reptilian. "A narrow fellow in the grass," Emily Dickinson once described it.

"This is a good place to find coral snakes," he says. "Pigmy rattlesnakes. Eastern diamondbacks. Over there, in the wetter areas, there are canebrake rattlesnakes and copperheads. Just your basic cafeteria of venomous snakes."

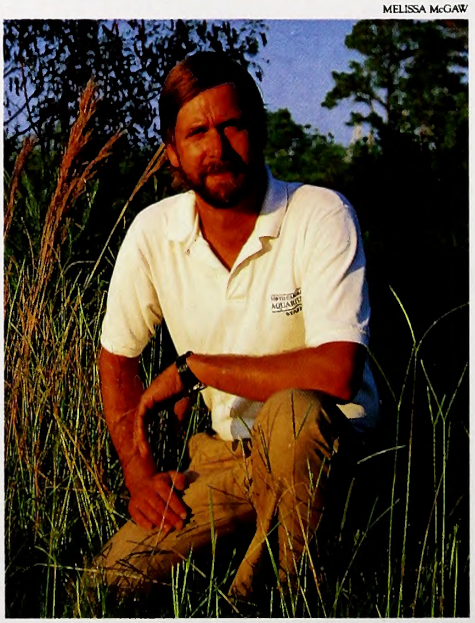
Curator of education at the nearby N.C. Aquarium at Ft. Fisher since 1988, Wood has been a lifelong "herper," someone with an interest in herpetology, or the study of reptiles and amphibians. He calls himself a fourth-generation collector, remembering fondly his father's handsome wooden cases

***High market prices** lure clandestine collectors to North Carolina's Coastal Plain where they capture a variety of rare and valuable reptiles, like this mole king snake. Fort Fisher Aquarium employees Paul Barrington (front), Andy Wood (rear, left) and Michael Suchy (rear, right) here demonstrate techniques illegal collectors use in capturing snakes.*

JACK DERMID

"Among collectors, it's almost as if there's a 1-800 number that you can call for information. 'Scarlet king snakes will be out on such and such road between these hours.' The word is out about North Carolina."
—*Andy Wood*

MELISSA McGAW



of insects from around the world. Wood has collected snakes and turtles since he was 15 years old, and he knows many of the tricks of the collector's trade.

Collectors "bait" an area like the one we're walking through by laying out plywood boards in the evening of a spring night and coming back the next morning to see what curled up underneath. "That's one of the techniques for mass collecting," he says. "Another thing that collectors do, and I did, was put together a master list of good automobile dump sites. There's no better place to find a snake than under a car door."

Wood uses the past tense a lot when describing his collecting passion, for he's grown troubled over the years by what he used to feel was an innocent pastime, a hobby that taught him much about wild creatures and that directed him on the path toward his present career.

More and more he wonders whether col-

***Collected in the past** for fish bait as well as for the pet trade, the Eastern tiger salamander today is listed as a threatened species in North Carolina. Collections of this large amphibian are prohibited except for scientific purposes. This large amphibian is mostly threatened by the conversion of its longleaf pine and Carolina bay habitat.*

lecting reptiles and amphibians is simple fun or simple larceny. What he knows is that North Carolina is a world-famous hot spot in the reptile and amphibian trade. Lured by the state's diverse habitats, and by the fact that many species have their northern and southern boundaries in the state, collectors of all kinds rummage through our woods taking snakes, turtles, frogs, lizards and salamanders—anything that's attractive, rare and valuable.

In some cases the animals are protected by law, yet the astronomical prices on the international black market are too much for clandestine collectors to resist. Common species, too, are being collected in quantities, ending up quite legally in pet shops, university laboratories, museums, zoos, aquariums and in the private collections of foreigners.

How many of our native reptiles and amphibians are being removed from their wild habitats? And are the removals having an impact on their populations? The simple and troubling answer to these questions is that no one knows for sure.

This lack of knowledge forced the N.C. Wildlife Resources Commission three years ago to amend its regulations governing collecting to limit the number of reptiles and amphibians that could be taken without a license. The modest law now states that collectors must purchase a $5 license if they intend to collect or possess five or more reptiles or 25 or more amphibians. They must also submit an annual report on the numbers of each species taken and their use.

"One reason we instituted this license requirement was to monitor the amateur and commercial activity going on with some of these animals," says Randall Wilson, coordinator of the N.C. Wildlife Resources Commission's Nongame and Endangered Species Program. "What we'd like to find out is how much collecting is going on, particularly with some of the rarer or more desirable species of herps, and if there is a lot of commercial activity, whether it's making those species rarer." He notes that three species—the Eastern coral snake, the Carolina pigmy rattlesnake and the Eastern diamondback rattlesnake—have been granted special protection from all collecting except for scientific purposes.

Wood has been aware of the keen interest in North Carolina's reptiles since he took his job about six years ago, and he suspects that what he knows is only the tip of the iceberg.

"When some of my friends from out of state find out I'm out here on the coast," he says, "they say, 'Oh, how far are you from Bladen County?' Or, 'Have you done Highway 51 between Castle Hayne and so and so. Barking tree frogs!' There are roads in eastern North Carolina that have nicknames like 'Pigmy Lane,' for the pigmy rattlesnakes that can be found there.

"Among collectors it's almost as if there's an 1-800 number that you can call for information. 'Rainstorm in Rockingham County last night, and another expected tonight. Scarlet king snakes will be out on such and such road between these hours.'

"The fact is that the word is out about North Carolina."

Unfortunately, *the word* may be making things tough for a number of our reptiles and amphibians.

Among the most sought after:

• **Bog turtle.** Found in North Carolina only in isolated Piedmont and mountain wetlands, this palm-sized turtle has fetched skyrocketing prices on the international black market. When clandestine collectors removed hundreds of the turtles a few years ago, the state listed it as a threatened species. Continued collecting, however, has put its populations in extreme danger. The World Wildlife Fund recently listed the bog turtle as among the world's top 10 "most wanted" endangered species, along with such exotics as the Siberian tiger and the black rhino.

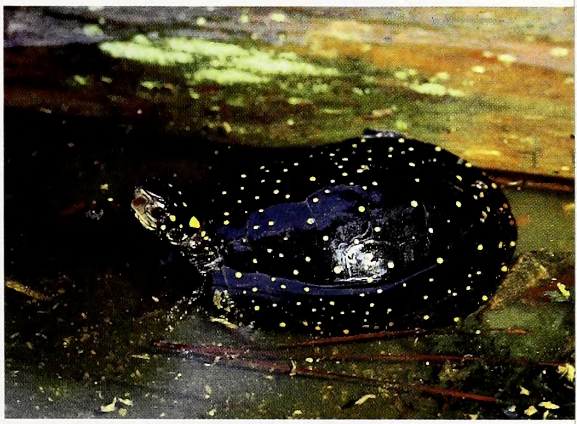
• **Carolina pigmy rattlesnake.** The smallest rattler in the United States is also one of most sought-after reptiles in the state, especially the Hyde County variation that can be a brilliant red. The mysterious color variation makes it rare and valuable. "These red pigmy rattlesnakes are a collector's item," says Wood. "Rattlesnake collectors who are familiar with the genotypes or at least the geographic variations will go to great lengths to get every one they can."

• **Spotted turtle.** One of the state's prettiest turtles is currently undergoing some of the most intense collecting pressure of any species. One man legally removed 500 spotted turtles from Tyrrell County, says Alvin Braswell, curator of reptiles and amphibians at the N.C. Museum of Natural Sciences. "I can tell you that the population in that county is depressed—it cannot handle that kind of take."

• **Box turtles.** Although considered one of the most common species in the state, this woodland turtle is being seen more and more on international price lists. One North Carolina dealer is shipping out 2,000 to 3,000 box turtles a year, according to federal officials.

JACK DERMID

***The barking tree frog,** the largest of the state's tree frogs, is a popular item among commercial collectors. Biologists know little about the habits of this frog.*



MELISSA McGAW

***The spotted turtle** is one of the prettiest of the state's turtles and one of the most sought after. Large numbers of this unprotected turtle have been shipped out of the state.*

JACK DERMID

***The pigmy rattlesnake** varies in color over its range. The coloration of this Hyde County specimen makes it highly prized among collectors. It is protected by regulation.*

Poachers Threaten Venus's-Flytraps

The legal and illegal trade in wild species threatens more than reptiles and amphibians. A case in point is the Venus's-flytrap (see pp. 2 - 3), an insectivorous plant endemic to a 75-mile area around Wilmington and sought internationally for its novelty. Habitat conversion and collecting have extirpated the plant from eight out of the 18 North and South Carolina counties where colonies once grew in the thousands. Many plants have been shipped to Japan and Europe where they are valued for their supposed curative powers.

Each year, an estimated 500,000 flytraps are collected from the wild. "The future is quite clear," says Cecil Frost, plant ecologist with the state's Plant Conservation Program. "The Venus's-flytrap will be confined to a half-dozen large public sites like Holly Shelter Game Land, Green Swamp and Croatan National Forest. Collecting will have a major impact on them because there are fewer colonies and poachers will know where to find them."

Continued illegal collecting on Holly Shelter Game Land prompted the state in 1990 to list the plant as a species of special concern. This listing prohibited the collecting of flytraps from another's land without permission, and it boosted fines from $10 to a minimum of $100 for a first offense and $500 for a second. Yet it seems to have had minimal effect.

"This year has been worse than ever for flytrap poaching," says Andy Waldrop, wildlife enforcement officer from District 2 who has been trying to crack down on the flytrap trade out of Holly Shelter. "The price has more than doubled for the flytraps, and we've had about 25 people going in there to dig. They're getting a whole lot more clever. We've only caught one all year."

MELISSA McGAW

***Wildlife enforcement officer** Andy Waldrop holds Venus's-flytraps stolen by a poacher from the Holly Shelter Game Land in Pender County. Highly valued on the international black market, flytraps cannot be taken from public property. A recent law prohibits flytrap collecting from private property without written permission.*

Biologists ask how long the population can sustain that kind of pressure.

Other highly valued reptiles and amphibian species include the mole king snake, scarlet king snake, Eastern diamondback rattlesnake, Eastern coral snake, corn snake, Outer Banks king snake, the Northern pine snake, tiger salamander, barking tree frog and pine barrens tree frog.

The impacts of collecting can be measured on an individual animal and on its population. In one respect, a reptile is ideal for the black market; it is easy to handle and it doesn't need to be fed for a long time—for several months, in the case of snakes. "Yet overall, collecting promotes a decline in the health of that animal," says Alvin Braswell. "It might be stressed by the time it gets sold and die soon after." Survival rates among collected animals are quite low.

But the impacts of collecting on the population are potentially more devastating. Braswell points out that turtles build up populations very slowly because of the high mortality among the young. The populations hang on basically because of the longevity of the adults—turtles can live to be 40 or even 50 years old. But removing huge numbers of adults can quickly depress the population.

"It just depends on the biology of the individual species," says Braswell. "Millions of broken-striped newts have been collected from the Coastal Plain and there's no problem with them. Newts are like mourning doves; they are real resilient."

Venomous snakes, on the other hand, are facing steeper odds. "Most people will kill them if they see them," says David Stokes, a wildlife enforcement officer from Dare County and lifelong snake enthusiast. "And if a lot of them are taken out of the wild and put in cages, that's going to cause the population to decline eventually."

Collecting can also alter the gene pool of a population, affecting its adaptability to a local area. If collectors return species to the wild, but not to the original location from which they collected them, they could introduce disease to a population, or worse. "If you take a snake out of one area and put it back into another, you're screwing with its genetic makeup," says Wood. "We end up with mole king snakes from Wake County being crossed with mole kings from Bladen County and producing genetic freaks."

Biologists are unanimous in pointing out that the impact of collecting is secondary to the impacts of habitat loss on wildlife populations, although it can easily compound the problem.

"Is collecting significant on the statewide animal populations?" asks Wood. "Compared to the impact of our highways, no. The most serious problem facing reptiles and amphibians is asphalt."

Yet habitat and collecting together can deliver a knockout blow to a species. Call it the "deadly spiral." It works like this: Habitat loss and fragmentation cause a species to become rare. Its rarity makes it valuable on the commercial market, increasing collecting pressure. Collecting makes the species even more rare, intensifying the collecting and raising the value even more, attract-

ing even more collectors . . . .

The pressure gets tighter and tighter, pulling a population on a downward slide that could eventually end in extirpation or even extinction. "The tragic irony is that the rarer species are, the more people want them," says Nora Murdock, endangered species biologist with the U.S. Fish and Wildlife Service in Asheville. "If they wanted common species, it wouldn't be a problem. But you get these extremely rare species that are left at just a few sites, and just a little collecting could throw them for a loop."

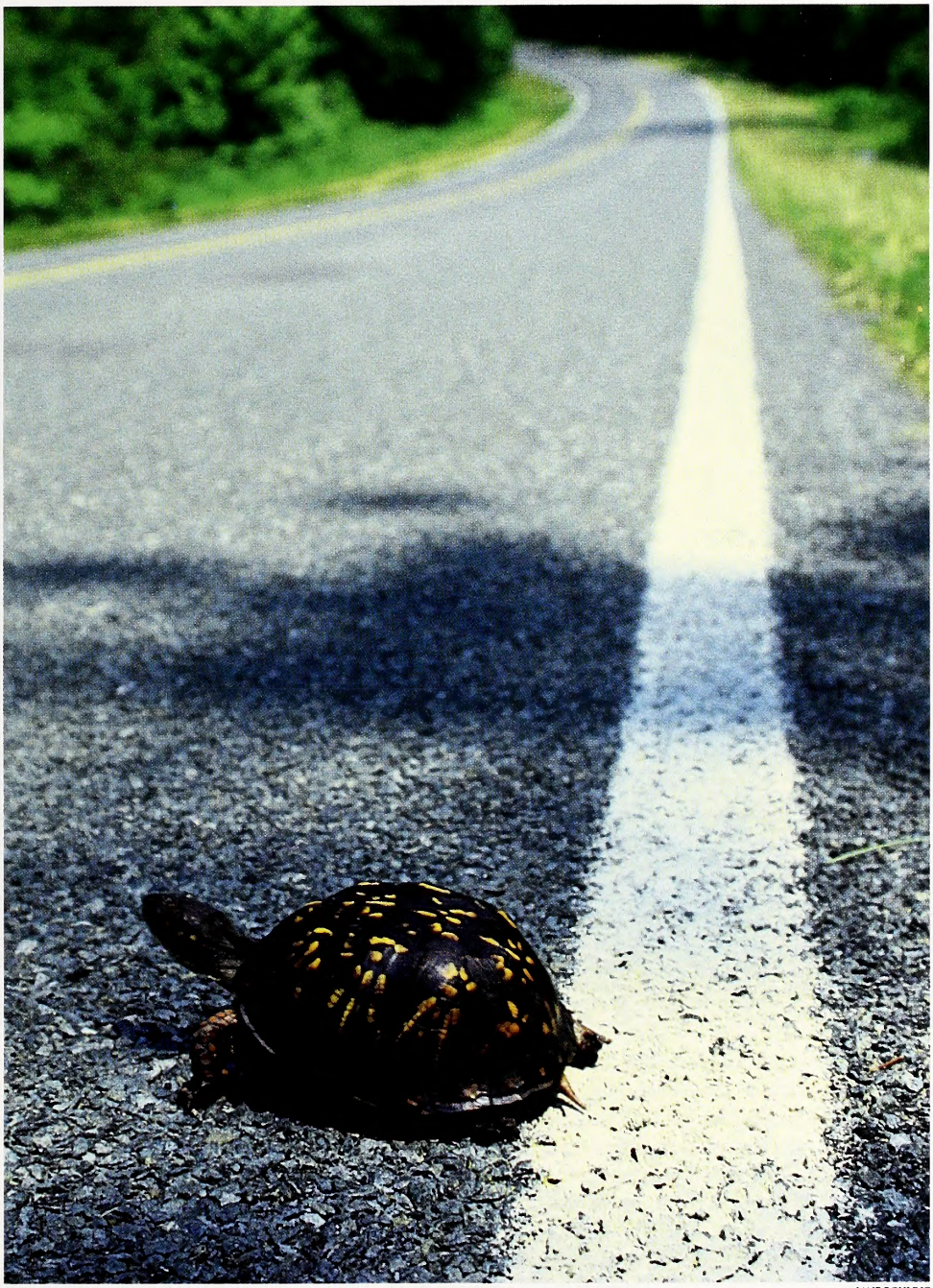
On certain nights of the year, a strange phenomenon occurs in Bladen County. Backroads normally empty crawl with slowly moving cars that stop now and then, their occupants stepping out into the warm, humid night. A good time to witness this is after the first spring rain in May. That's when the snakes are moving, the males following scents laid down by females. Inevitably the reptiles cross the roads and that's where they are picked up by the drivers of the cars, collectors.

Who are these collectors and what draws them out into the spring night? Most likely they don't include what may be the largest percentage of collectors in the state, the amateurs who take an occasional turtle from a pond or a red eft from a bed of mountain moss and bring it home. While state officials concede that they don't know the cumulative effects of amateur collecting, they believe that they are mostly harmless. Many biologists cite these early experiences as shaping their professional careers.

The cars prowling the Bladen County backroads may well contain another kind of collector, however, whose impacts are far more serious. These are entrepreneurs looking for turtles, snakes and amphibians for the pet trade. They will sell their catches to giant commercial operations in Florida that traffic in an astonishing array of reptiles and amphibians from every corner of the world. In these businesses' monthly catalogs, you'll find everything from red pigmy rattlesnakes ($150 each) and canebrake rattlesnakes ($45 each), possibly from North Carolina, to East African gaboon vipers ($575 a pair) and Pakistan Indian pythons ($1,750 a pair; "BREEDERS! These are so nice I want to keep them myself," says one ad).

"The number of people interested in keeping snakes is increasing," explains Wood, "and so collecting is increasing. Ironically, as we make people appreciative of things like reptiles and amphibians, more and more people want to keep them."

Because of the demand, many biologists complain that some commercial collectors in North Carolina have a take-all-you-can-get mentality that can quickly cripple or even wipe out local populations. "I don't have a problem with private individuals keeping a turtle for a while and then returning it to the place they got it from," says Dennis Herman, assistant curator of herpetology at Zoo Atlanta. "The problem is with those who collect 50, 75 or 100 turtles for sheer profit. That's the kind of collecting that bothers me."



JANE ROHLING

***Roads and habitat loss** are the chief threats facing reptiles and amphibians. Thousands of slow-moving reptiles like this box turtle are killed on highways each year. As species are made rare by habitat loss, they attract collectors who may further whittle down reptile populations.*

What often drives these collectors is the international market, especially in Japan and Europe, where novelty items such as North Carolina's bog turtles and Venus's-flytraps fetch astronomical prices.

"The most frightening thing about the reptile trade now is the international aspect," argues Tom Bennett, the U.S. Fish and Wildlife Service's chief enforcement officer for North and South Carolina. "The pet business in Japan and Europe is tremendous. Every kid in Japan wants a box turtle. If one guy from North Carolina is selling 2,000 box turtles a year, you know that there are others that we don't know about. How long will it take for that kind of demand to have an impact on our turtle populations? We just don't know."

Sometimes the traffic in rare and com-

JACK DERMID

***The handsome coloring** of this mole king snake makes it valuable for the snake trade. The snake occurs only infrequently in North Carolina, although over a wide area.*

mon species features another kind of person, a private collector with a penchant for the exotic and the rare, and a giant-sized bank account to back up the obsession. Some people collect Picassos and Rembrandts; others collect rattlesnakes.

"The rattlesnake people are almost fanatics," says Wood. "There are people who are obsessed with having every species and subspecies and genotype of rattlesnake. They go to Santa Catalina Island in California for the rattleless rattlesnake; to Brazil for tropical rattlesnakes." Obsessions like this make the red pigmy rattlesnake from Hyde County a "must-have" for every serious collector. "As time goes on, there are people who boast, 'Oh yeah, my pigmy rattlesnake is from Hyde County, North Carolina." Variations mean that much.

Still another breed of collector prowling the roads of eastern North Carolina at night is the biologist from universities, zoos, aquariums and museums. The same rare species that draw commercial and private collectors also attract biologists, although their motives differ—a biologist generally wants specimens for educational purposes or for scientific study, not for commerce. Yet the subject of collecting has raised ethical issues even among biologists.

"I'm familiar with an aquarium in the New England area that put together a collecting trip to North Carolina for pine barrens tree frogs," says Wood. "They had an exhibit of these tree frogs at that aquarium. I don't have an ethical problem with that. Of course, I have to hope they collected from healthy populations that were not threatened by over-collecting. And I hope their public display includes interpretation about the animal and its state in the wild, so it does some educational good."

What he shakes his head about, however, is the practice, now somewhat less common, of assigning biology students to collect a certain number of species for a grade. "I don't see much value in that," he says. "We don't need to be wasting wild populations on students who probably aren't going to pursue a degree in the subject anyway."

Biologists also struggle with other ethical dilemmas governing their practices. Wild populations of reptiles and amphibians are collected by university researchers for genetic studies and other kinds of biochemical analysis, and by museum curators who seek "voucher specimens" for their permanent collections. Tagged with the date and place of their capture, these specimens form the basis of a natural history museum's permanent collection.

Some biologists say that given the precarious situation of many reptile and amphibian populations, such captures can be unnecessary and perhaps even harmful. Yet at the Museum of Natural Sciences in Raleigh, curator Alvin Braswell explains that a museum's collection of voucher specimens has a vital purpose.

"Much of the knowledge of North Carolina's declining populations comes from information drawn from our collections and from our data files," he says. "Most scientific collectors are interested in long-term issues such as the ecology and evolutionary history

of species. The older a museum specimen is, the more valuable it can become, in ways that we may not be able to predict."

A good example, he notes, occurred recently when the Division of Environmental Management took tissue samples from a fish preserved for several decades at the museum. DEM wanted to know whether the mercury level in a coastal river was higher or the same as in the past. In the absence of other records, the flesh of the preserved fish provided the necessary data.

Even so, biologists are learning new techniques to minimize their effects on the reptiles and amphibians they work with. Biochemists used to take large numbers of a single species for their genetic studies, says Peter Weigl, professor of biology at Wake Forest University. "But nowadays we can take a few drops of blood from the animals, and that's all we need. We don't kill the animals, and we release them."

Dennis Herman has also changed his procedures over the years. In his work with bog turtles in the mountains of North Carolina, he is less invasive than he used to be. "I won't kill a turtle just as a voucher from a certain county," he says. "I photograph it, measure it, weigh it, mark it and release it. I do all my data in the field and release the turtle at the point of capture."

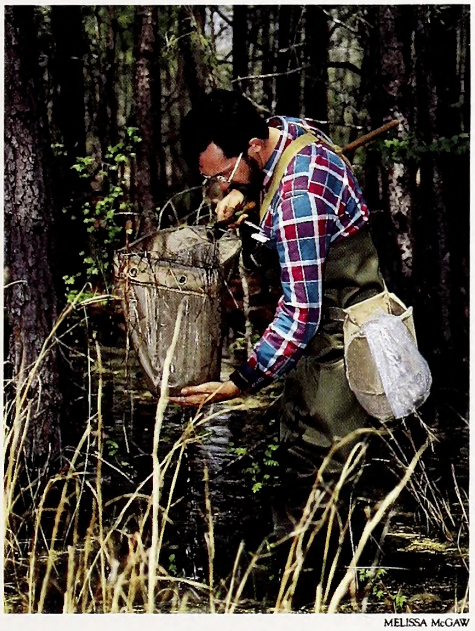
By all reports, North Carolina's reptiles and amphibians are already reeling from habitat loss, habitat fragmentation and highway development. Just what the impacts of collecting are on top of these other problems is unknown, but many observers believe they are serious. "It definitely scares me," says Randall Wilson. "If we're not concerned with the impacts of collecting, especially animals going into the pet trade, then species that are common today may well be rare in 50 years." For many species, it may take less time than that.

What are the ingredients of better protection for reptiles and amphibians in North Carolina?

• **Protect habitat.** Species originally become rare not from collecting but from habitat loss and fragmentation. Habitat protection, then, may maintain healthy and numerous populations of reptiles and amphibian species. This is especially true because legal protection may be a double-edged sword for a species made vulnerable by habitat loss. "Protection makes a desired species harder to come by and thus even more valuable," says Braswell.

• **Strengthen laws.** Though North Carolina's law was intended to monitor amateur and commercial collectors, most of the 150 collectors who have bought licenses in the two years since the law was instituted have been scientists. Wilson admits that he's getting little or no reporting from the very collectors that the law was intended to monitor. "We're concerned that not all the people who are collecting are aware that they need a license or are abiding by the terms of it," he says.

Thus the law may need to be toughened, say some biologists. "I'd like to see it fixed so that someone can still go out and take a pet but that the commercial aspects are reduced," says Braswell. A stronger law may also help out enforcement across state boundaries. Because North Carolina's law is weaker than



MELISSA McGAW

Virginia's, says the FWS's Tom Bennett, North Carolina is becoming a laundering area for specimens illegally collected there.

"Virginia has become very concerned about its reptile population," he says, "and it recently passed tough laws regarding how people can do business there. As a result, people may be collecting in Virginia but claiming they were collecting here."

Pennsylvania's law may be one of the toughest on the East Coast. It allows anyone with a fishing license to collect no more than two reptiles or amphibians per day. Exceptions are protected species, which are totally restricted; the snapping turtle, which may be taken in quantities at any time of year; and the timber rattler, which is restricted to one specimen per day during a seven-week season. The law entirely prohibits the sale of snakes and turtles. "Reptiles and amphibians cannot be collected, offered for sale, or traded for commercial value," says Richard Snyder, Chief of the Division of Fish Management with the Pennsylvania Fish and Boat Commission. Thus while amateur collecting is allowed, collecting for commercial purposes has been effectively eliminated.

• **Make an example.** Federal and state wildlife enforcement officers say that judges and district attorneys need to attach more importance to cases involving violations of wildlife collecting laws. "Snake cases are not real popular in courts," says Bennett. "The resource may be depleted, but we still can't get a prosecution because it's not something that the courts are concerned about."

For violations of the state law protecting bog turtles, Dennis Herman recommends stiff punishments. "I'm not talking about a one-year sentence and a $5,000 fine," he says. "I mean something like five years in jail and a $100,000 fine."

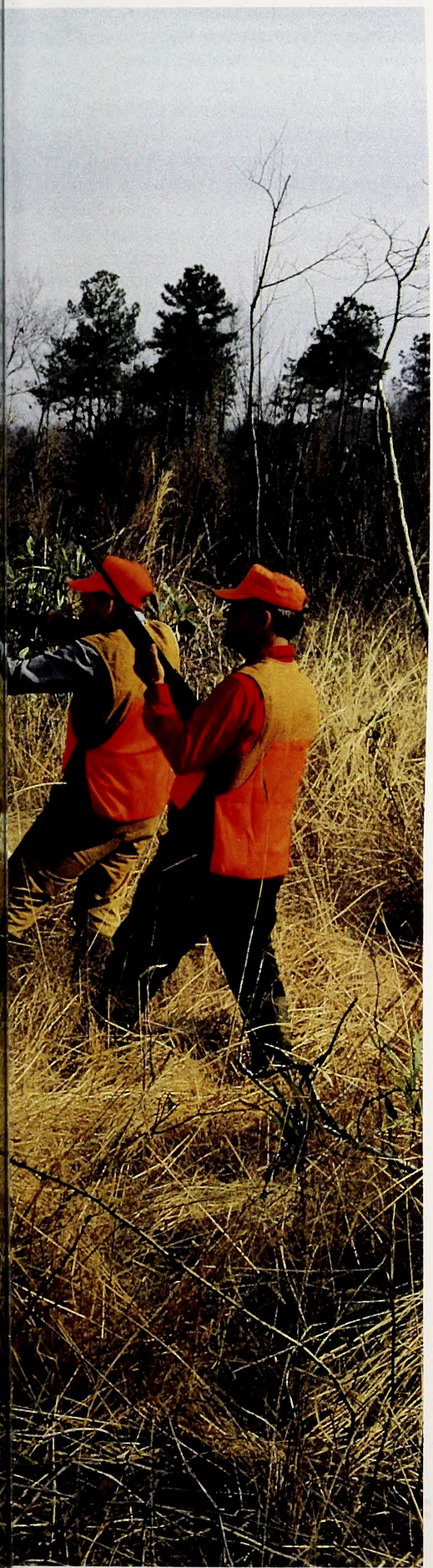
"I'd like to see the law fixed so that someone can still go out and take a pet, but that the commercial aspects are reduced."

—*Alvin Braswell*

• **More education.** Landowners need to be involved in the protection of rare species on their property, and this means that efforts to educate them about the animal and its habitat need to be high priorities. Anne Somers, president of the N.C. Herpetological Society, has been alerting landowners in Surry County to the existence of bog turtles on their property. "I show them what a bog turtle looks like and how it differs from a box turtle or a painted turtle," she says. "I've also alerted them to the black market for these turtles." Hopefully this kind of educational effort may reduce the illegal take of turtles.

• **Higher ethical standards.** All collectors should be concerned with the cumulative impacts of their activities on a population, says Randy Wilson. "This is especially true about animals with small distributions and with low reproductive capabilities." Alvin Braswell adds that all collectors, whether they are in the pet trade or in a museum, need to have their consciousness raised. "Even I need to be reminded of the impacts of what I do," he says.

Until some or all of these recommendations are followed, North Carolina will continue to be the equivalent of the untended jewelry store, open for looting. Our native reptiles and amphibians deserve better than this. ☒



Quail and Cutovers

Like them or not, cutovers have replaced much of our diverse bobwhite habitat. Still, they provide a brief window of hunting opportunity for sportsmen with thick hides, lots of patience and good dogs.

written by Vic Venters
photographed by Ken Taylor

I cannot say, with all honesty, that I've had my finest quail hunting in cutovers. I can't even say that I particularly enjoy hunting cutovers. Perhaps it is, as a former president might say, an "expectation thing." After all, few field sports have been as over-romanticized as Southern quail hunting, dressed up in its petticoat of plantation mythology—a game for gentlemen who ride mule-drawn wagons and shoot fine double guns behind rock-steady dogs of noble lineage. This illusion will go up like the *Hindenburg*, though, especially after a full day of tramping through a few hardscrabble Carolina cutovers.

Part of the problem is that cutovers are so hard to hunt—from the catbrier and devil's walking stick that shred the best of brush pants, to the stump holes and snags that claw your stride. But what really punctures my enthusiasm is the typical cutover's mind-numbing monotony—acre after acre of stumps, stomped out logging decks, and endless thickets of vine and brier. Out in this sea of sameness, there are few visual pegs to hang your hopes for making game, few areas that please your eye. On the bad days, cutover hunting takes on that air of random, aimless wandering, like trolling the Gulf Stream on a fishless day.

Yet come each November, there I am, stepping into cutovers with gun in hand. Early in the season, I might even wear a smile. For the cutovers have quail, sometimes lots of them, and that gives these plots of chopped forest a certain redeeming quality that makes up for some of their aesthetic shortcomings.

***A single flushes from** a cutover located near an agricultural field in eastern North Carolina. While not always aesthetically pleasing, cutovers offer good bobwhite habitat for several years after initial logging.*

Like them or not, loblolly pine cutovers are becoming more and more important these days to bird hunters who have watched bobwhite populations decline sharply in traditional agricultural settings. In my neck of eastern North Carolina, clean farming seems to get cleaner every year—sanitizing crop and cover with chemicals, sweeping fields of hedgerows and weedy areas. The once-vast longleaf savannas, with their fire-maintained wiregrass understory—a bobwhite heaven, by the way—have long vanished from private lands in North Carolina. Throughout the Southeast, quail populations are down at least 70 percent since the early 1960s.

It is also true that loblolly monoculture, with its emphasis on fire suppression and thick pine overstory, has played a role in the long-term decline of bobwhites, not to mention other wildlife species. Most bird hunters, I suspect, would like nothing more than to see old-time, small field farming and the diverse longleaf pine ecosystem return—bringing with it scads of quail—but it's not going to happen unless it's economically and socially feasible. Currently, it's not, at least on a landscape level.

So we make do with the best we've got which, ironically, happens when the logging trucks and skidders come a-calling to a loblolly stand. The resulting cutovers may not look good to us, but quail have a new home in the making, albeit for a short time. Removing the forest canopy allows sunlight to hit the ground, stimulating the growth of native grasses and, where present, legumes. Bobwhites from nearby areas will quickly colonize the cutover, generally after two years of growth provide suitable breeding habitat and cover.

Between two and four years after logging, cutovers are in their prime as bobwhite habitat, providing the requisite breeding and escape cover, native foods and water. As an added plus, there are generally no agricultural

VIC VENTERS

***Food plots** are one way to improve hunting success in cutovers, especially where the soil is poor and natural foods are scarce. This plot of kobe lespedeza, located on an old logging road, is flanked by stands of weeping lovegrass, a clump-forming warm season grass that provides erosion control and excellent cover from predators.*

chemicals used, nor does any type of mowing or crop harvesting take place during summer nesting season.

To many new bird hunters, or to those making the transition from farm field hunting to cutover shooting, the logged-out landscape is not only ugly, it's intimidating. Where do you find quail in those vast cutovers, many ask, and what do you need to know to hunt them?

As to specific strategy and tactics, we can talk about them from now until fishing season, but you won't be able to buy a bird for your gamebag unless you own, or have access to, one all-important possession—a good bird dog, preferably two of them, ideally four. The more trained dogs the merrier, because cutovers are no easier on them than they are on humans, and tired dogs can't smell. From my experience, a pair per half day would be ideal. Of course most of us would do well to own one crackerjack bird dog, much less four.

If you're in this boat, you need to maximize what you've got. Obviously, cutover dogs must have keen noses, simply because they really have to *find* quail in a far larger amount of habitat than, say, a farm field with easily defined edges, hedgerows and brush patches. The heart of a crusader and a hide of chain mail wouldn't hurt either, for a cutover dog must show a willingness—even eagerness—to flog through the omnipresent brush and brier.

Call me prejudiced, but I believe English setters—judged by these generalities—have the strongest requisites for making cutover dogs *par excellence*. Not because setters necessarily have the best noses or biggest hearts—that depends on the dog—but because their longer hair provides more protection from briers and such. Having just dug a hole for myself with the pointer folks, I'll go ahead and crack the shovel over my head with this: big running dogs, pointers or setters, can be star players in the cutover game.

Of course, anyone who follows the bird dog press knows that horizon-chasers out of field trial stock have gotten a lot of bad press of late. "Range too far," is the standard lament. "Uncontrollable, too." But for cutovers, especially the big ones down east, dogs with vinegar for blood will put you in the feathers. They simply cover extra ground and expose you to more birds. Choosing a dog like this assumes you can control it and keep it staunch on point while you catch up, but that's another story. You don't buy a Ferrari to obey the speed limit; don't fool with field-trial stock if you plan to hunt many brush patch fields or woodcock coverts.

A good dog should take care of most of your tactical decisions, but there are a few larger strategies to keep in mind. First, cutovers don't last long as quail habitat. After five years, young pines, hardwoods or shrubs begin shading out the groundcover of grasses and legumes on which bobwhite depend. You may have quail present another two years or so, but the head-high growth makes dog tracking and shooting difficult. By seven years, most quail have left or disappeared from cutovers.

For this reason, you should have your best luck hunting cutovers between two and four years old. Young cutovers adjacent to agricultural fields are almost guaranteed to have quail. Small fingers of cutover woods between agricultural fields are also excellent places to hunt, especially during midday when the birds may have returned after feeding from edge habitat.

Cutovers located in forest tracts are a bit more problematic. In this case, a clue to their bobwhite potential can be found under your boots—fertile land produces more quail than poor, acidic soil. In large part, that's because good land grows more wild legumes—beggarweed, milk peas, partridge pea and lespedezas—the native foods that quail relish.

If you want to get serious about surveying cutovers for food and quail potential, I would suggest buying the book, *A Guide to And Culture of Flowering Plants and Their Seed Important to Bobwhite Quail.* This illustrated field guide, which is considerably more pithy and to-the-point than its title, was co-authored by quail superguru Walter Rosene and lists 150 native flowering food plants. One general note: legumes and other quail foods aren't very easy to identify in the fall and winter when they've lost their flowers and their color. Summertime is far better for plant identification.

Now some bad news. The better the soil the lusher the legumes, but the bigger and more vicious the briers. Plenitude has a price, in this case perforated legs. Cutovers on good soil will also grow out of their quail-producing prime more quickly as flourishing pines shade out the groundcover.

On most any cutover, old logging roads—which offer an edge within an edge—are always a good place to start, especially early in the season before the birds get skittish. In years when there is a good mast crop—pine seeds, acorns, dogwood, bayberry and the like—it's always a good idea to hunt the mature woods adjacent to a cutover, where the food is plentiful.

Where I hunt in southeastern North Carolina, the biggest hills I encounter have ants coming out of them, so my experience with rolling terrain is rather limited. Cutovers in the rural Piedmont can demand different hunting tactics, however. Wayne Jones, a N.C. Wildlife Resources Commission fisheries biologist, hunts lots of hilly clearcuts in northcentral North Carolina and has great success with a few simple ploys. "In the early morning, quail will usually be out feeding on the tops of hills, so I hunt there first," Jones says. "Later in the day, I'll work my dog through ravines or along stream bottoms in the cutover." The quail like to use the thicker brush down in the draws as holding cover, and it possibly provides some succulent food, too.

***A team of trained dogs** that will back each other is essential for cutover hunting where you have to cover a lot of ground to find quail. Here, a Brittany backs an English pointer.*

Food plots can tremendously improve cutover hunting, especially on poor soil where wild foods are scarce. If you plan to establish them, a few caveats bear mentioning. First, food plots must be surrounded by adequate escape cover, the latter being absolutely *essential* in these days of elevated predator levels. If you're putting in a perennial plot, you need to own, lease or have access to land, have a tractor and sundry equipment, then seed, fertilizer and lime. Lastly, be prepared to go through the expense and considerable time required to plant the stuff in what is often an isolated forest setting, all done at a time when the fish are biting pretty well.

Easy, it's not. Still, properly located food plots can elevate cutover hunting from an endurance contest for you and your dogs to a pleasant stroll with steady shooting. I can't stress enough, however, the need to surround your plots with cover and, once they are established, not to over-hunt coveys attracted to them, especially in late winter.

Bird hunting of any sort remains remarkably free of gadgetry. However, two items that can help your cutover hunting are a beeper collar and a bobwhite whistle. Both help with finding—the quail in the latter case, the dog in the former.

If you plan to use a bobwhite whistle, you need to be out in your hunting area in the half hour between first light and sunrise, another blow, surely, to the myth that says Gentleman Bob keeps gentlemen's hours. By making the plaintive-sounding "assembly" or covey call—*whewt ... whewt ...whewt*—birds will, in theory, respond with whistles from their roost, allowing you to pinpoint the covey's general location. While you do not actually attract birds into gun range, quail whistles share an important similarity with duck calls: they don't always work. Many times, quail will simply keep their beaks shut during this rueful serenade. According to Terry Sharpe, the Wildlife Commission's small-game project leader, calls seem to work best in the early part of the season, October and November.

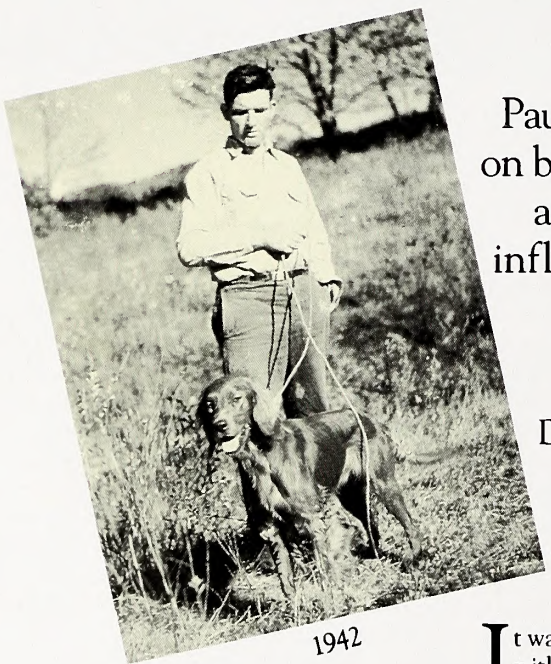
A beeper collar, however, needs only batteries to work as advertised. Beepers are especially useful in cutovers because brush and grass often completely obscure the dog. On collars of the better sort, the tone or signal will change when the dog points. Some of these beepers are concocted to sound like a hawk screech in the point mode, thereby halting in their tracks any quail with a notion to run.

On the best days, my cutover hunts will end with one of those classic late-winter sunsets, a cloudless sky slowly turning orange, and, as the sun comes down, the broomsedge glowing amber like a good German lager. My father and I will have spooked up a few coveys, most of them over points, and we'll have scratched out a few birds, too. Top, our setter, will settle in his dog box, chew out some cockleburs, and give one of those long satisfied groans as only a tired bird dog can.

Dad and I will sit on the back of the lowered truck bed and neither will say much—no need to. We just soak it in. If not as good as it gets, it's as good as its gonna get.

These days, that's good enough.

LOOKING BACK *with a* LEGEND



1942

Paul Long wrote the book on bird dog training, and his accomplishments and influence reach far beyond North Carolina.

written by
David H. Henderson ©1993

It was a bright June morning set for a visit with an old friend in the rolling Carolina foothills above Lincolnton. We had come to see Paul Long, a dog trainer extraordinary. Today our cast of characters included Vic Venters and photographer Ken Taylor from the staff of *Wildlife in North Carolina*, and Stan Meares, a friend of Paul's from Hickory. You already know the first two, but Stan deserves a mini-profile of his own.

Stan is an almost retired banker and a dynamo of energy who spent a number of years in Raleigh before returning to close out his career in Hickory. He was nice enough to come along and bring two broke bird dogs for the camera session, since Paul had closed his kennels after Hugo damaged them. Stan's Fastrack kennel holds a small number of fine English pointers, and Stan will quietly let you know that Flatwood Hank, a national champion of a few years back, has had a serious input into the bloodlines there. I remember when two Flatwood dogs, Hank and Bill, sold for an alleged $40,000, and Hank's stud fee is $500. So Stan goes for quality if not quantity in the pointing dog field. More about his Molly later. I was bound to like him—he bought my lunch and a copy of my book.

This gathering was a conspiracy of sorts to collect some of the lore surrounding one of North Carolina's imported treasures, a transplanted Yankee from Massachusetts who married a girl from the prominent Ramseur family of Lincoln County. One of the fine features of *Wildlife in North Carolina* has been turning the spotlight on Carolinians important to wildlife and its sporting scene, but who are not always widely known. I have been acquainted with Paul Long for almost all of

KEN TAYLOR

Dog trainer *Paul Long brings up Fast Track Molly behind Fast Track Ladybug at his home near Lincolnton. These English pointers come from the kennel of Stan Meares, one of many bird dog trainers Long has influenced over the years.*

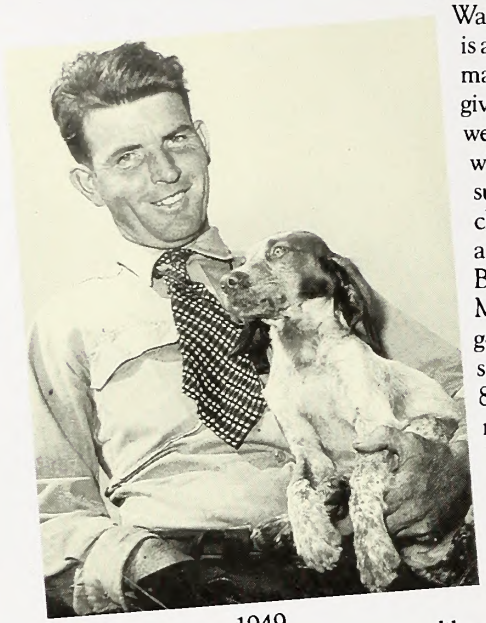
the 20 years he's lived here, first at Maiden and now near Lincolnton.

Years back, someone referred him to me as a qualified trainer with a public kennel who would give a trainee pup an honest effort and the owner an honest appraisal. This being a rare contribution, I hauled up a couple of beautiful setter pups and left them with great expectations. The pups were high-bred with Eugene's Ghost on the male side and Sports Peerless on the dam's, and there was no way they weren't going to be world beaters. After a month, Mr. Long said, "No hope; too wide running to make walking dogs and substantially unbiddable!" I couldn't believe it. Two trainers and a lot of money later, I had to wish I'd listened to Paul.

Paul was born April 19, 1916, at Woburn, Mass., where his father was a leather worker, and he was working kennels by the time he was 12. He earned his trade with a neighbor until he was old enough to leave home at 18 to take two trips to the Canadian prairies with well-known professional trainer Michael Seminatore. Back home, luck smiled as he became employed with another "big-time" trainer, Elias Vail, goodwill ambassador for the Gaines Dog Food Company. The exposure was great for a young man, and he rapidly became known in fieldtrial circles in the Northeast.

Paul will fuss at me for mentioning it all, but to appreciate fully the accomplishments of the man, you must know that he has made his mark in the dog-training world despite an infirm left hand and handicapped left leg. That said, he has handled dogs and horses from the beginning.

Now, gentle readers, you must read this profile in perspective. I once had an editor turn down a story about fly fishing in Germany during World War II. The editor said, "My

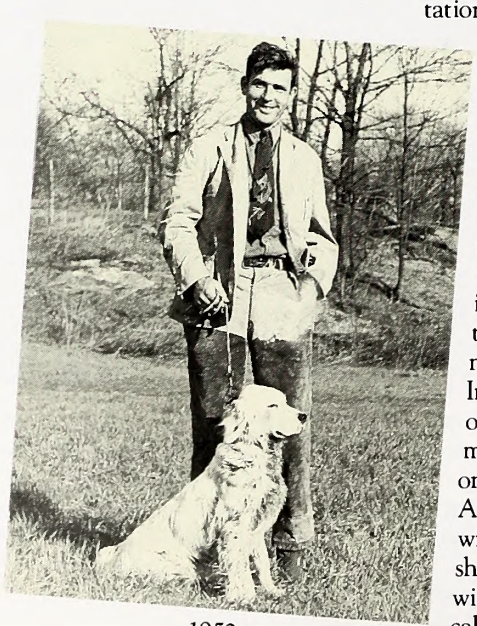


1949

readers don't even know there was a World War II." So you must know early on that this is a story of a legend, and legends aren't made overnight. But Paul Long's story will give you the flavor of how things once were in field-trialing and dog training, when wild birds were the staple. His first success independently was in developing champion Brittany Brit of Bellows Falls, a recognized early winner among the Brittanys. Employed by the late Dr. John Meachen, he brought along the unforgettable Colonial Lady M., featured for several years in Coca-Cola ads. Paul ran 80 or more trials for Dr. Meachen, rapidly making him a veteran.

Not being in service, he was seized by wanderlust during World War II. His story of cadging gas tickets (gasoline was rationed), buying used tires, and other adventures while on the way to take 38 dogs to North Dakota reads like a dimestore novel. He remembers that he had 19 flat tires on the first trip. But that was pheasant country, and Paul says that it was nothing to move 500 wild birds *a day*. How can we visualize such plenty?

At the end of the war, now steadied down, he spent the next 17 years building his reputation as a free-lance trainer. During the hunting season, he ran the kennels at Davant Plantation in Ridgeland, S.C., owned by Edwin Berolzheimer (later simply Berol). The plantation gave young Long a stable living and marvelous opportunity to develop his own style of dog training.



1952

It was during a couple of those years that he engaged in what I, and probably most of our readers, might have thought was an impossible task of retrieving the Irish setter from the show bench and returning it to the field. As you may know, the hunting instincts had largely been bred out of this once-proud sporting dog. This is not to say that there were no hunting Irish in the 1930s and '40s. Paul says one of the greatest was Sonny Boy's Godmor, "which possessed style running and on point equal to any English setter." And Duke the Ninth, an "honest dog with excellent manners on game." Nor should we ignore Jim Flythe of Raleigh with his Flythe kennel of red dogs. One called Little Red won the futurity at Hoffman in the Sandhills and came back the next year to win the Open Shooting Dog stakes.

While at Davant, Paul worked Mr. Berolzheimer's red fieldtrial dogs including Rufus McTybe of the Cloisters, who was campaigned in New Jersey and the National Pheasant championship. It is hard for us here in the South to realize that fieldtrial activity was also popular in the New England and Northeast states. But consider that there was once a plethora of game there, mostly pheasant, grouse and woodcock that sparked the breeding and trialing of pointing dogs. Many Easterners owned quail plantations, and money greased the skids for summer training of high-bred dogs in the prairies. Long indicates that the action was great and competitive, and that red dogs became widely respected.

Some of this came about because a man named Ned LeGrand of Pennsylvania determined that he would rescue red setters. LeGrand, however, cross-bred setters so widely with English setters that he was barred from AKC registration. But before his professional demise, he had bred champion Whirlwind Hobo, a true Irish hunter. Hoping to stir up a little controversy, I asked Paul to comment on the differences between the AKC red setters and those registered with American Field. This is a never-ending dispute with strong and knowledgeable adherents on each side. I knew he'd snort and speak up. He did, but this is a family magazine so I won't quote. Let's just say that he leans heavily toward American Field.

Paul takes credit for introducing the "covey holder," which is his name for what most of us know as a "call-back pen." There is no question that it is a boon to hunters in keeping live birds for training, and indispensable to the shooting preserve. He also tells of seeing a dog back on the sight of a white bag blown against a fence, giving him the idea of the plywood "backoff-dog," painted by an artist friend. I have one kenneled in my shed. That device, sometimes called a "Get-Back-Jack," is used by most trainers today.

But when Paul opened his training kennels in North Carolina 20 years ago, he might have dropped from public view but for his sterling book, *Training Pointing Dogs*, first published in 1961. Since that time it has been in continuous print, the latest edition reprinted by Lyons and Burford. Its popularity is due to its simplicity. Paul teaches that teaching a dog to be staunch to wing and shot can be done simply and easily. His precept is that dogs "wish to please themselves," and will not alter that until feeling some discomfort. This does not mean severe punishment, but does demand discipline. Nevertheless, he strongly contends that you must always keep your dog happy; that an unhappy dog will not hunt and that you must always give the dog an opportunity to obey. If the dog objects too strenuously to your methods, better find a new way of accomplishing your goals. Dogs have a hell of a memory.

Stan had picked up a dozen pigeons from Paul's cote for use in the photos for this article. I mentioned that I had read of

MELISSA McGAW

***Paul believes** the bobwhite quail is second only to the ruffed grouse for bringing out the best in a bird dog. Woodcock are perhaps easiest for a dog.*

the long life expectancy among pigeons used in training bird dogs. Paul identified a single bird in the carry-box and said it was probably 12 years old and that some birds would live 20 years. I was surprised and asked how they survive dog-mouthing. "That's your job," he said.

We planted a pigeon, and brought Stan's Fastrack Ladybug up to point, but heat and dryness made it almost impossible for even a cold-nosed bird finder to scent. Then I brought up Molly to back. She was staunch as expected. Uncharacteristically, when we flushed the bird, Molly took off, dragging the lead, a half-inch nylon rope with a loop knotted in it. When she didn't return after we'd whistled, we were faced with a dog owner's nightmare—a lost dog on a knotted lead in strange territory. Horror stories of hung-up bird dogs flooded our minds. If not found within hours in summer heat, a caught-up dog will perish. Stan displayed remarkable cool, much more than I would have under the circumstances. But after a lunch break, he, accompanied by Ken Taylor, set off to walk the thick, brush-covered territory. And the day ended happily when, in about an hour, the miscreant had been located and brought safely back. She had been caught by the cord in a barbed-wire fence where Ken found her. Moral: Never anticipate perfect behavior from even the best-trained dogs. Paul adds, "Never, ever, leave a checkcord on a free-running dog without a slip collar." Good advice from a master.

Oh yes, with those deep-set eyes twinkling, Paul told us the story of the French lady who left her dog with him for boarding. In strongly accented French, she admonished him to give her dog a candy treat every day. To that end, she left him a 24-count box of Hershey's chocolate bars. Paul says he developed a taste for chocolate, and neither she nor the dog ever knew the difference.

Before we left, this amazing 77-year-old shared with us a lot of information picked up in six decades of bird dog training, much of which was useful even to such old hats as me. He is almost a vet, knowing cures, treatments and dosages for almost every known dog ailment. And after every serious comment, he'd come through with another humorous story.

My favorite: While trying to break a retrieving bird dog from eating birds, he once sprayed a dead bird with "No-chew," a bitter concoction designed to prevent dogs from chewing on furniture, boots and the like. His dog dashed after the tossed carcass, spit out the vile tasting thing, and returned birdless. Sent back for another try, the dog discovered that the head, which Paul had held while sousing the body, had none of the "No-chew." So gingerly, the dog picked up the bird by the head and retrieved it to hand to the proud trainer. The pay-off, Long says, was that thereafter the dog always retrieved scrupulously holding in his mouth only the bird's head.

Vic had a question. Or rather a pair. "What game bird," he asked, "do you believe brings out the best in a pointing dog?" Paul was quick to answer. "A ruffed grouse. The dog must have an acute sense of how close he can get, moving silently through the cover to point. But next is the bobwhite. For a dog must be able to handle 15 to 18 birds feeding on the ground." He went on to tell why prairie chickens in the wind are too skittish, and running pheasants too frustrating, to permit classic dog work. Woodcocks are the easiest game bird for the dog that has short range and handles well.

"So what is your favorite all-round dog breed?" Vic asked. Paul replied, "In field-trials, I would choose English pointers. They train more easily and run the edges, while setters dig into cover and neglect the edges where the judges can appraise them." Paul also thinks setters don't hold their training as long as pointers, but once the setter "gets it right, he'll get the nod over the pointer."

"If I had to choose my favorite breed for a private shooting dog, I'd secure a field-trial English setter bred for the grouse woods. The only dog that ever met my criteria was Colonial Lady M., an 80 times field-trialer who always adjusted to all conditions and type of country."

Well, Paul Long, you've become a North Carolina treasure. All of us who love pointing dogs are in your debt. ☐

David H. Henderson's latest book, On Point: A Bedside Reader For Hunters and Fishermen, *is available for $22 postpaid from Patrick Publications, 1122 Berkeley Avenue, Charlotte, N.C. 28203-5260.*

Paul Long's book, Training Pointing Dogs, *is available for $14 postpaid from the author by writing Paul Long, R.D. 2, Box 558-A, Lincolnton, N.C. 28092.*

Abo, for Short

Return with us to those thrilling days of yesteryear—about 30,000 B.C.—and learn the basic skills our aboriginal ancestors needed to survive.

written by Burt Kornegay © 1993
photographed by Ken Taylor

Steve Watts of Gastonia might be called a Stone Age man. For one thing, with his thick, sturdy legs and torso, large head, broad face and woolly covering of beard and hair, he looks as if he has just emerged into the modern world from one of the caves of Ice Age Europe. For another, Watts' thoughts dwell on man's ancient, primitive past. As director of the Aboriginal Studies Program at Gastonia's Schiele Museum of Natural History, Watts spends his days trying to understand and to teach others about the life of prehistoric and aboriginal peoples, with an emphasis on the cultures of the American Indians of the Southeast before the coming of Europeans.

Watts points out that of the roughly 1 million years that archaeologists say humans have existed on the planet, men spent the first 95 percent as aboriginal hunters and gatherers. They lived in small communities, made all their tools and material goods out of stone, wood, bone, antler, hide, shell and plant fiber, and possessed an intimate knowledge of nature. Watts considers this long period of prehistory—referred to by archaeologists as the Paleolithic period, and popularly called the "Stone Age"—to be "the great common denominator of humanness." It was the million-year milieu in which man, developing primitive technologies and tool-dependent ways of living, became fully human. And Watts believes that we can gain insight into that time if we learn how to do the things people did then to live.

"The learning and practice of aboriginal skills can help us all get in touch with our own roots—no matter what our particular heritage may be," he says. "Here in North America, we look to the Indian peoples to teach us the skills that are 'native' to this place. Yet, if we go back far enough into our own pasts, we discover that we are all aboriginal peoples at some time in some place . . . .Primitive or 'first' skills are our shared inheritance."

Through years of self-study in archaeology and anthropology, combined with the diligent practice of prehistoric tool-and-weapon-making techniques, Watts has become an aboriginal craftsman. Using a deer tine, he can flake a raw piece of rock into an arrowhead, knife blade, drill bit or hide scraper. In his hands, animal bones become needles, awls, pins, buttons, flutes. From plant fibers he makes sandals, fishing line or cord for snares. And almost as fast as you can light a fire with matches, he can make fire by friction.

Watts began to work at the Schiele Museum in 1984, teaching school students about Southeastern Indian history and giving tours of the replica of a Catawba Indian village that had been built on the wooded hillside behind the museum. In 1985 he started the Center for Southeastern Native American Studies at the Schiele, and he began a series of workshops for teachers, museum workers, anthropology students, hunters, camp directors and anyone else eager to learn aboriginal skills. At these workshops—now housed in a restored 19th-century log cabin standing next to the

***Craftsmen at the** rendezvous use ancient techniques to make aboriginal tools like this knife chipped from stone. The handle is deer antler, and the sheath is handmade of brain-tanned deer hide.*

***Lights inside teepees** make them glow like giant Chinese lanterns at the annual fall Rivercane Rendezvous. In the distance, campers gather around a fire to share their knowledge and appreciation of the skills early man used to survive.*

***Campers cast shadows** as they gather for one of the early morning meetings to discuss the day's scheduled events. Dave Holladay also uses these meetings to share a bit of aboriginal philosophy.*

Catawba village—Watts offers diverse courses under titles such as Southeastern Woodland Bows, Basic Bone Working, Introduction to Flint Knapping, Building a Bark House, Rhythm of the Ancients, and Net Making. Watts makes it clear that these are neither wilderness survival classes nor sessions in which participants "play Indian." Instead, they are experiential courses in which participants try to understand prehistoric cultures by learning prehistoric skills.

At a recent workshop, "Braintan Buckskin," a dozen adults under Watt's tutelage followed traditional Indian methods to scape, tan and smoke deer hides. After two hard-working days, each participant had transformed a bloody wad of hide into buckskin as soft, supple and warm to the touch as chamois. During evening sessions they examined buckskin moccasins, leggings and shirts. They heard how the Indians made jerky from venison, bow strings from deer sinew, glue from deer hooves and tool handles from antlers. And they began to understand the importance of the deer to the original inhabitants of this land.

Although his Schiele Museum title is "Director of Southeastern Native American Studies," Watts simply calls himself an "abo"—short for aborigine. It is a name he shares with a thriving group of people across the state and nation. Taken all in all, these "abos" are diverse. Some live in Kentucky caves, some in Atlanta condos ("urban abos"); a few teach in universities, others eke out an existence hunting and gathering in western wilds. However, along with Watts, all of them are preoccupied with learning aboriginal technologies, and many of them further believe that by "going primitive," they can simplify their lives and re-establish a vital connection with "the old ways" and with nature.

The abos meet at "Knap-ins" and "Indian festivals," co-sponsor workshops and run survival camps together. To promote the teaching and practice of aboriginal skills, in November 1989, 10 abos from around the country met with Watts at the Schiele Museum to form the Society of Primitive Technology. Since then, under the editorship of David Wescott, president of the Boulder Outdoor Survival School in Arizona, the Society has published a biannual journal called the *Bulletin of Primitive Technology*. The *Bulletin* features how-to articles, detailed drawings of prehistoric weapons and tools, reports on experiments in primitive living, musings on the value of learning aboriginal skills and "Aboman Cartoons," by Watts. It even has a personals column, with queries from the isolated—"Any flint knappers in the Pittsburgh area?"—and the lovelorn—"SWM seeks SWF - healer/huntress 25,000 to 30,000 years old."

In the East, the abos' chief gatherings take place just over the North Carolina border, at Unicoi State Park, near Helen, Ga. Called "rendezvous," these gatherings run the last week of April and the third week of October each year in the meadow beside Smith Creek. The Unicoi rendezvous were started in 1985 by three North Carolinians and a Georgian: tepee maker and master buckskinner Darry Wood of Haynesville; Snowbear and Khalisa Taylor, owners of Pepperland Farm Camp, near Murphy; and Bob Slack, "abo-ranger" at Unicoi State Park. Initially the rendezvous were small affairs—friends circling up their tepees to socialize and to practice what they called "earthskills." But today they attract students and instructors from across the country, with participation held to around 100 people.

The Unicoi rendezvous are not for the lazy. At sunrise, Snowbear walks through the "village" of tepees and tents, brush huts and canvas tarps playing a Plains-style flageolet to awaken the sleeping. Then after a communal breakfast, he raises a conch shell to his lips and, with a loud bellow on it, calls all to a "big circle" around the central fire. There the instructors explain what they will teach that day, and the group then breaks into a dozen workshops.

Out in the meadow, Bob Slack teaches the ancient art of fire by friction to an encircling class. Under the trees beside Smith Creek, Walker Calhoun, a Cherokee elder, takes his students step by step through the process of making rivercane blowguns and locust darts, the traditional Southeastern Indian weapons for hunting small game. In the creek, Steve Watts and a group are picking through smooth rocks, looking for ones to peck into "stone bowl lamps" of the type found in the Paleolithic caves of Europe—while on the bank a few other students crouch with Snowbear around a fire to learn how to render the fat of a woodchuck into oil for the finished lamps. Meanwhile, Eva Bigwitch of Cherokee sits next to Darry Wood's handsome Sioux

***Steve Watts holds** the tinder as his young student (right) blows on the spark to fan his first friction fire. Watts shows his students how to make their own fire-making tools (below). By rotating a wooden spindle using a bow, the friction creates enough heat on the board to generate a spark that can be blown into flame when placed in dry tinder.*

Each evening, *campers gather around the fire (top) to share stories, sing and play drums, flutes or other instruments used by early man. During the day, various crafts are taught such as scraping and tanning deer hides like this one stretched on a frame (above).*

Indian-style tepee teaching the painstaking art of basket weaving; and herbalist Doug Elliot, heading up a line of foragers, hikes toward the woods in search of edible and medicinal plants. So it goes all day, as the abos, using prehistoric know-how, turn the raw elements of nature into objects that are both beautiful and useful to man.

After supper, the village relaxes. Some abos sell or trade items they have made, such as stone knives, pottery, bone or feather jewelry. Others get together for a friendly game of "abo-frisbee," with a dried beaver pelt. As darkness falls, all head toward the yellow flames of the central fire. They bring with them drums of every description, from bongos to tom-toms, along with tortoise-shell rattles, South American "rain sticks," Southeastern rivercane flutes, and other primitive instruments from around the world. Snowbear begins to beat out a deep-tone rhythm on his resonant ashika drum. Another drummer joins him, then another. Darry starts to stamp and spin, the long fringes swaying on his buckskin shirt. And soon Unicoi State Park reverberates with song and dance.

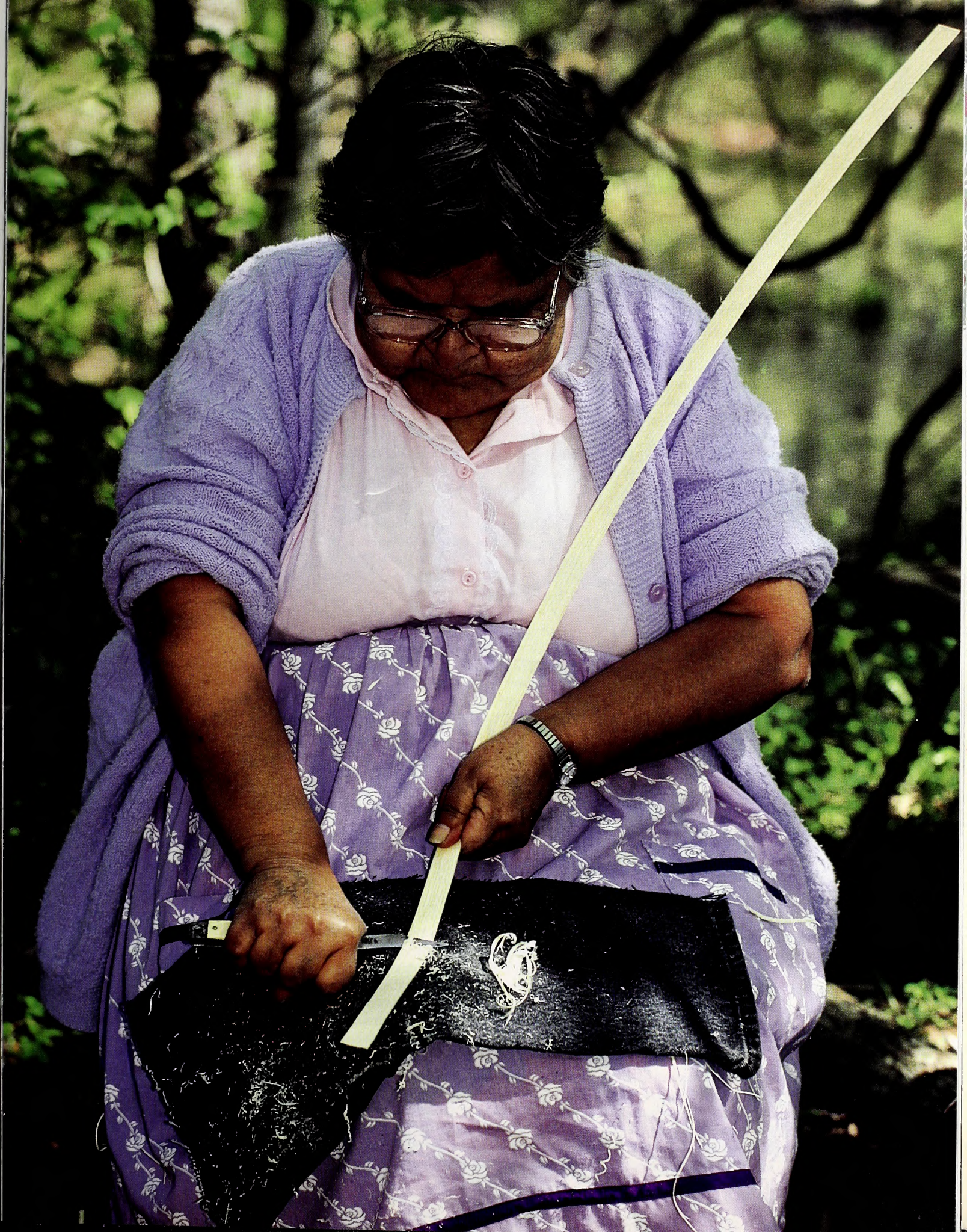
Although Watts says he has been "banging on rock and scratching on sticks" as long as he can remember, he speaks respectfully of the book, *Ishi in Two Worlds*, published in 1961, that he says helped him set his course as an abo. Written by Theodora Kroeber, wife of the eminent and late American anthropologist, Alfred Kroeber, *Ishi* is the biography of a Yahi Indian named Ishi, who, after more than

Cherokee elder, *Evilin Calhoun, shapes a white oak splint that she will use to make an oak basket as part of a class she conducts at the Rivercane Rendezvous.*

40 years of hiding in the mountains of northern California with the dwindling remnant of his tribe, in 1911 came out alone to confront the modern world, bringing his Stone Age culture with him intact. Kroeber tells how Ishi, in the last four years of his life, taught anthropologists about the ways of his people and demonstrated his skills to visitors at the Museum of Anthropology at the University of California, in San Francisco. "There were more than a thousand of them who watched Ishi at work on a single autumnal afternoon," wrote Kroeber. What she wrote next might stand as Steve Watts' and the abo's creed:

> *"When Ishi fashioned a tool or weapon under their eyes, or made fire with his primitive fire drill . . . the long road of history, lost in the darkness of remoteness, became illumined and its distance telescoped, for man is the world's craftsman, the maker of tools, and what one man fashions with his two hands is not strange to another man's appreciation and understanding."*

Burt Kornegay is a professional wilderness outfitter, guide and owner of Slickrock Expeditions, in Cullowhee, N.C.



SQUIRREL WARS

Surrounded and vastly outnumbered, our intrepid commander in the Battle of the Bushytails wins lasting fame with his terse response to the demand that he surrender. "Nuts!" says he.

written by Warren Dixon, Jr. © 1993
illustrated by Jackie Pittman © 1993

I have nothing against squirrels. Squirrels are OK if they're fixed right, like in a Brunswick stew. I wouldn't trade a T-bone for one, but if you're having a hard winter, a squirrel will do in a pinch.

So, when I saw the squirrel in my bird feeder, knee deep in sunflower seeds, it didn't bother me one bit. I just went to find my gun.

Having grown up in Chatham County, I had often hunted the gray squirrel with considerable luck. As a matter of fact, my memory of the luck grew more considerable with every year that passed. If the truth were known, we would have starved if left to me to bring home fresh meat in those days, but the truth is rarely known at my house.

Since those days of my youth, the gray squirrel, or Ratus Aggravatus as it is known in the scientific community, has overtaken the suburbs. So it wasn't a total surprise to see one in my backyard.

"Is this rusty thing in the attic my gun?" I asked Sandra.

"You can't shoot Mr. Squirrel," she answered sweetly.

The squirrel had been in my sunflower seeds less than an hour and it already had a surname.

"Besides," Sandra continued, "it's illegal to shoot a gun in the city limits. We've got houses within 30 feet all around us."

If I'd pushed my constitutional right to bear arms, I could have won this argument

easily. But then who wanted to spend the night outside with Mr. Squirrel.

The sunflower seeds had been purchased in hope of attracting some wayward goldfinches to my feeders. So far I had managed to lure a horde of sparrows, two fat doves, several crows and what looked like a goldfinch but turned out to be a sparrow with jaundice.

Now the sunflower seed, which cost slightly more a pound than filet mignon, were being devoured by a hairy rodent.

There was only one thing to be done. When a man is deprived of his gun, he must fall back on the one thing that separates us from the animal kingdom: logic.

I drove down to the lawn and garden center.

"I'm looking for a bird feeder a squirrel can't get into," I told the clerk.

"There's no such thing," the clerk replied. "Don't you own a gun?"

"Of course I do," I said. "You don't think I'm a wimp or something do you? It's just that I've become more civilized over the years and don't need to shoot small helpless creatures in order to feel like a man anymore."

"In other words your wife won't let you," he said.

"Something like that," I replied, "plus it's illegal where I live."

The clerk brought out a pad and pencil and proceeded to draw a curious contraption consisting of a long wire, varying sized spools and baffles. In the middle hung a bird feeder.

"Hang this up," he said, "and your squirrel will never eat another sunflower seed."

I went home to build this wonderful invention. I found some clothesline wire in the shed, but needed some spools and baffles. These I found in the house, among stuff Sandra should have thrown away years ago. I took several spools of thread from her sewing cabinet and salvaged a bunch of old records, both 45s and 78s, for the baffles.

I strung all these on the wire, with the feeder in the center, and tied the wire securely between two maple trees. For good measure, I greased the wire with lard.

"I dare a squirrel to even attempt to get at those sunflower seeds," I told Sandra. "The Flying Wallendas couldn't traverse that wire."

"Well, the circus must be in town," Sandra said, "because there goes a squirrel on the wire now without a net."

I looked out the window and watched as a squirrel deftly leaped over five Fats Domino records and landed in the bird feeder.

"I hope those aren't my Fats Domino records," Sandra said, "they're irreplaceable."

There was a scream from the back yard. We rushed outside. There, underneath the maple trees, wrapped in wire and spools and broken records, was the meter reader.

"I hope these aren't Fats Domino records," he said, "they're irreplaceable."

I helped him up and brushed him off. There wasn't a squirrel in sight.

"That squirrel is so shook up he'll never return," I gloated. "This just goes to show that man can be victorious without resorting to violence," I told Sandra, ducking as she threw a handful of broken Fats Domino records at me.

From the other maple tree, a squirrel chuckled as he sat in the feeder chewing on sunflower seeds.

I grabbed a mop from the deck and raced toward the tree. Mr. Squirrel was so shocked he didn't move, but sat amid $4.50 worth of sunflower seeds stuffing himself.

I hurled the mop at him like a javelin. It flew halfway up the maple tree lodging there and frightening Mr. Squirrel so bad that he sat up and licked his paws. Probably greasy from all that sunflower oil, I surmised.

Taking off a shoe, I threw it right past Mr. Squirrel. It stuck in the dogwood tree behind him. I slung the other one and lost track of it in the trees.

I picked up a garbage can lid and flung it at him like a Frisbee. It spun into the tree and fell clanking to the ground. Mr. Squirrel was so disoriented that he jumped down into the lid and sniffed around for some more sunflower seeds.

Finally I went back into the house triumphantly.

"We won't have any more squirrel problems," I announced.

"What's the lawn chair doing up in the maple trees?" Sandra asked. "And where are your shoes?"

"Look," said Jamie, "there are three Mr. Squirrels out there now."

"Four," said Sandra, "there's one in the lawn chair."

I looked out the window. It was a squirrel convention at the bird feeder. I ran back outside. This called for desperate measures, I thought, spotting the garden hose. I knew that squirrels were deathly afraid of water. Or was that cats?

I turned on the water full blast and adjusted the nozzle to a stream that would have floored a cow. Aiming the hose into the tree, I sprayed squirrels left and right.

The water shot straight up into the tree and right back down on my head. The squirrels danced around on the upper limbs and showered me with water again. They were bound to be demoralized by the way they were jumping around in the water.

Through foggy glasses I noticed that all the squirrels had disappeared. Once again human ingenuity had triumphed over nature.

Then I saw Jamie feeding 16 squirrels bread crumbs in the front yard.

I drove back to the lawn and garden center.

"You look like a drowned squirrel," the saleslady said.

"Thank you," I replied, "have some sunflower seeds."

"You need some new socks," she said noticing my shoeless feet. "That one has a hole in the heel."

"Never mind that," I said, "I need to know what I can do for squirrels."

"Feed them peanuts," she said, "they dearly love peanuts."

"Let me rephrase my question," I replied. "I need fewer squirrels. It's squirrel city at my house now and some of them even have names. Do you have any Squirrel-Be-Gone?"

She pulled a book from under the counter. It was an *Audubon Society Guide to Attracting and Feeding Birds Although For Millions of Years They Have Managed Quite Well On Their Own Until We Came Along*.

"There are only two things you can do with squirrels," she read, "you can kill them, trap them or tolerate them."

To me, this worked out to three things, but then I was never much at math.

"That leaves you only one rational alternative," she added.

"Kill them," I guessed.

She shook her head.

I drove home. Our yard looked like Water Country USA. Jamie was spraying squirrels with the garden hose. They were waiting in line for their turn. In the back yard "Going to Surf City gonna have some fun..." was blaring away from a hidden radio. Squirrels were sliding down the mop handle in the maple tree and landing in the puddles below.

Jamie handed me the hose.

"They seem to like it best when you spray them," she said. The squirrels sat up on their hind legs in the tree. I could have sworn they had on bathing suits, but the lawn chair blocked my vision.

"What's in the bag?" Jamie asked.

"Peanuts," I replied. "They dearly love peanuts." ☒

Venison Donations Needed

North Carolina Hunters for the Hungry Program Under Way

Written and Edited by Vic Venters

Taking Aim Against Hunger

There will be a little less hunger in northeastern North Carolina this winter, thanks to the efforts of North Carolina Hunters for the Hungry, a new coalition of individuals, organizations and state agencies that will provide low-fat ground venison to needy citizens.

Under the pilot program, venison will be donated by hunters to one of four approved meat processors located near Wake Forest, Wendell, Jacksonville and Belhaven. North Carolina Hunters for the Hungry will pay the meat processor to prepare the venison into wrapped, 2-pound packets that will then be picked up by the Food Bank of N.C. of Raleigh and the Albemarle Manna Food Bank of Elizabeth City. The food banks will distribute the ground meat as needed to charitable outlets serving the needy.

N.C. Hunters for the Hungry is modeled on similar highly successful programs in states like Texas and Virginia, where such organizations distribute hundreds of thousands of pounds of venison to needy citizens each winter.

To fund the pilot program and cover meat processing fees, the N.C. Wildlife Federation and the Wake County Wildlife Club each made contributions. Because of limited funds, the first year of N.C. Hunters for the Hungry will be much more limited in scope than already established efforts in other states.

"Since we have to pay a fee for each deer that is processed, we are starting small," said Tacker LeCarpentier of Raleigh, one of the founders and co-chairman of the new organization. "We will be limited geographically to the northeastern section of the state, from the Jacksonville area up to the Elizabeth City area over to Interstate 85. We hope to return as much meat as possible to the area where the deer came from."

The program was formed last year after discussions between Rev. Marshall Ware of Christ Episcopal Church of Raleigh and LeCarpentier, a Raleigh attorney who is a member of the church. Among the agencies and organizations now participating are the Food Bank of N.C., the Albemarle Manna Food Bank, the Inter-Faith Food Shuttle, the African American Fishing and Hunting Association, *Carolina Adventure* magazine, the Subcommittee on Hunger for Christ Episcopal Church in Raleigh, the N.C. Wildlife Federation, the N.C. Sportsmen's Alliance, the N.C. Department of Agriculture, the N.C. Department of Environment, Health and Natural Resources and the N.C. Wildlife Resources Commission. The organization has non-profit status under the Food Bank of N.C. umbrella.

"I think it's important to stress that we don't have an agenda with this program," LeCarpentier said. "Our simple goal is to reduce hunger in these areas by utilizing the renewable and plentiful natural resources of our state. We welcome all who wish to participate."

To make a tax deductible donation, for more information on the program or for addresses of participating meat processors, please contact N.C. Hunters for the Hungry, P.O. Box 10502, Raleigh, N.C. 27605-0502.

Order Over Telephone

Hunting, Fishing Licenses Available by Credit Card

North Carolina sportsmen can now order certain hunting and fishing licenses by telephone using Mastercard and VISA credit cards. In addition, hunters may now report their big game kills over the phone.

Sportsmen purchasing licenses by telephone will be able to hunt or fish immediately after the telephone call. They will be issued an identification code and license number during the call and their licenses will be mailed within two working days.

To make the telephone transaction go smoothly, callers should have paper and pen ready to record their identification code and license number. They should also have their credit card number, driver's license number and Social Security number handy. To purchase a hunting license, applicants must have held a hunting license prior to July 1, 1991, or successfully completed a hunter education course.

Licenses available to residents or nonresidents are: annual sportsman, comprehensive hunting, comprehensive fishing, basic fishing and basic hunting. Nonresidents may also purchase short term 6-day hunting, 3-day basic fishing and a 3-day comprehensive fishing license.

Harvest of deer, bear, boar and wild turkey may be reported by telephoning toll-free 1-800-261-1382. The telephone number for ordering hunting and fishing licenses by credit card is (919) 715-4091. Sportsmen desiring more information on licenses of any type may call the Commission's license division at (919) 662-4370.

—Bodie McDowell

Waterfowl May Suffer

Funding Shortfall Hampers Mattamuskeet

Times are tight theses days at Mattamuskeet National Wildlife Refuge as budget shortfalls continue to hamper wildlife management operations at the popular North Carolina refuge.

In the past year, personnel at Mattamuskeet in Hyde County have had to close some roads because there is not enough money to maintain them, thereby restricting angler access to prime fishing areas. Wintering waterfowl may also come out on the losing end because of cutbacks to management efforts that provide natural food for wintering waterfowl in the refuge's numerous impoundments.

The reason? While the federal government continues to acquire wildlife refuges across the nation, congressional appropriations to manage the refuges have not kept pace with acquisitions. Consequently, refuge managers have been forced to try to stretch dollars and personnel to manage a greater amount of land. Hiring freezes have also hurt as managers have been unable to replace retiring personnel.

While many refuges are feeling the financial pinch, Mattamuskeet has been hit especially hard. "Over the past decade, we've dropped from a staff of 14 people down to seven," said Don Temple, the refuge manager for Mattamuskeet, Cedar Island and Swan Quarter. "It's drastically affected our ability to effectively manage these refuges. For instance, we've only got three maintenance people to cover all the maintenance work, repairs and machinery operation for three refuges encompassing 80,000 acres."

From a wildlife perspective, the budget pinch is being felt most keenly in the refuge's waterfowl impoundment management program. On average, 120,000 ducks, 35,000 tundra swans, 8,000 Canada geese and 5,000 snow geese winter at Mattamuskeet each year, attracted, in part, by abundant natural foods. Refuge personnel alter water levels in impoundments around the lake to encourage food growth in spring and summer, then reflood the impoundments in the winter as waterfowl migrate in.

"Under current conditions, we don't have enough people to run the pumps or maintain them in working order, or even enough money to buy the fuel needed to operate them," Temple said. "Over the long run, I'm a little worried. Unless we can properly control water levels, the plant communities in these impoundments will eventually change to species that are less favorable to waterfowl, meaning less food for wintering ducks."

Temple added that he is expecting two more personnel to be added this fall. "That will help some, but we'll still be short."

Parks Referendum on Ballot Nov. 2

For the first time in North Carolina's history, a bond referendum to support state parks will be presented to the voters of North Carolina. The $35 million bond referendum is an effort to respond to the overwhelming demands citizens are making on today's state parks.

A minimum of $24.5 million will be available to fix up parks. These funds will be applied to a $169 million backlog of urgent repairs and renovations to ensure safety, as well as to develop facilities, visitor centers, trails, campgrounds and picnic areas. The bond also provides up to $10.5 million to buy land to protect significant natural resources at existing parks.

—Information courtesy of N.C. Division of Parks and Recreation

The 1994 North Carolina Wildlife Calendar Is Here!

***With such artwork** as James A. Brooks' "Brookside Beard Society" featured above, the North Carolina Wildlife Calendar is sure to sell out.*

The works of Robert C. Flowers, Jr., Dan Johnson, Ken Helser, Alan Cheek, Jake Taylor, Shannon Critcher Jones, Robert B. Dance, Bob Herr, Duane Raver, Mel Steele, James A. Brooks, and Dempsey Essick are featured in the 1994 Wildlife Calendar. Order yours today by returning the form below with your check or money order to 1994 Calendar, N.C. Wildlife Resources Commission, 512 N. Salisbury Street, Raleigh, N.C. 27604-1188.

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Please send me ..... N.C. Wildlife Calendars at $6.00 each $_____

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Office located at: 322 Chapanoke Rd., Raleigh N.C.

All orders must be prepaid. We do not bill. A $20.00 charge will be made on returned checks (N.C.G.S. 25-3-512).

For fund raising and bulk rate information (10 calendars or more), call 919-662-4377. Please allow 6 weeks for delivery.

CALO94

Proceeds go to Refuge

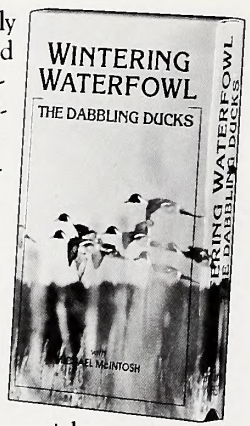
New Duck Video to Help Mattamuskeet

A North Carolina photographer and video producer has recently released the first of three waterfowl videos filmed at Mattamuskeet National Wildlife Refuge, with 10 percent of proceeds from their sale going to help the financially strapped federal refuge.

The Dabbling Ducks, featuring nine dabbling duck species, was filmed and produced by Joe Albea of Greenville. It highlights waterfowl behavior and biology on wintering grounds, and was written and narrated by Michael McIntosh, one of the nation's finest firearms and natural history writers.

The Dabbling Ducks is the first of a three-part video series titled "Wintering Waterfowl." The next two videos in the series will be *The Diving Ducks* and the *Tundra Swan*, available in late spring 1994. All were filmed at Mattamuskeet.

Proceeds from the film will be specifically earmarked for waterfowl management at Mattamuskeet. "Both waterfowl and Mattamuskeet have always been very special to me," Albea said. "Since all the videos were filmed there, I felt it was important to give something back to the resource."



The video is in VHS format. Prices are $29.95 plus 4.50 shipping. North Carolina residents add $1.80 sales tax. For more information, contact Joe Albea Productions, 150 E. Arlington Blvd., Suite C-106, Greenville, N.C. 27858, or call 1-800-227-3984.

Wildlife Endowment Fund Report

August 1993

Principal Balance
$18,654,772.00
Interest Earned
$12,171,413.59
Total Receipts
$30,826,158.59
Interest Used
$5,175,203.48
Fund Balance
$25,650,982.11

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

Bird Counts on the Way

by Vic Venters

For avid birders, next month also offers a perfect time to participate in the National Audubon Society's annual Christmas bird counts. In North Carolina, about 40 separate Christmas bird counts are made around the state. Each count is conducted within a 15-mile diameter circle by groups of 10 or more observers. Both the species and the numbers of birds seen are recorded and tallied, and the compiled results are published annually in *American Birds*, one of the Audubon Society's magazines.

Researchers have used Christmas count data in dozens of projects, and results from the counts can be used to measure approximate long-term population trends.

Observers are always needed and welcome, so if you'd like to participate, keep the following in mind when making holiday plans. Counts are made within a single calendar day during the official Christmas bird count period, which runs between December 17 and January 3. There are basically three types of observers: field observers, feeder observers and, on a more limited basis, boat observers for coastal and pelagic species.

Dawn to dusk counts are preferable to shorter ones, and should last at least eight hours. The participation fee for a field observer is $5, which will get your name published in *American Birds*. Payment is optional for feeder observers, but with payment your name will also be published. Areas in eastern North Carolina that still need counts include Mackay Island/Currituck Sound, Elizabeth City and Jacksonville. The Piedmont is generally well represented, but observers are welcome in established counts. Counts are needed in several mountain counties. If it's too late to organize a new count for your area this fall, you can always join an existing group.

For more information about starting a new count, contact *American Birds*, Christmas Bird Count, 700 Broadway, New York, N.Y. 10003. For information on joining existing counts in the state, contact ornithologist Harry LeGrand, a regional editor for North and South Carolina. He can be reached at home at (919) 832-3202 between 6 p.m. and 10 p.m.

N.C. Wild Store

Take advantage of these great items and you'll support conservation education throughout North Carolina. Proceeds from the sale of these publications will support the development and production of educational projects and programs.

"North Carolina WILD Places *will become a standard reference...The book combines accurate descriptions and illustrations in a way sure to attract both casual and serious readers. It really is a wonderful addition to the literature about the natural heritage of our state."*

—Fred Beyer, Past President, N.C. Science Teachers Association

North Carolina WILD Places Map Print

Charming, signed limited-edition art print showing North Carolina's wild places as seen by artist Jackie Pittman. 1,000 limited-edition and 100 artist's proof prints. Also available as a poster. 36" x 24".

Item code E2-4

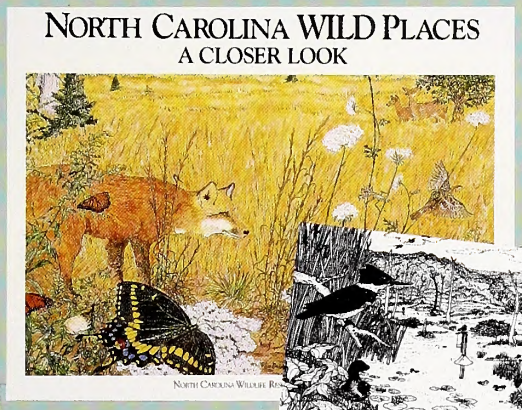
Article Reprints from Wildlife in North Carolina Magazine

"The Spawning Runs." Informative article on the anadromous fish of North Carolina. Two-page map.

Item code M4

"Gardens for Butterflies." For the gardener who wants to attract some of nature's most colorful creatures. Species to plant, butterflies that will visit.

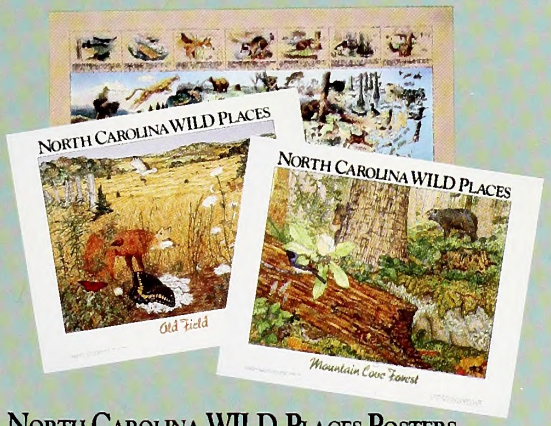
Item code M5



North Carolina WILD Places: A Closer Look

Easy-to-read text and Anne Marshall Runyon's delightful illustrations make wildlife habitats come alive in this 82-page book. Discusses 13 habitats across the state.

Item code E1



North Carolina WILD Places Posters

(Set of 3): Posters of "Old Field" and "Mountain Cove Forest" from *North Carolina WILD Places: A Closer Look*. Shipped folded with poster version of WILD Places Map.

Item code E5

WILD Places book and posters.

Item code E6

Lizards of North Carolina

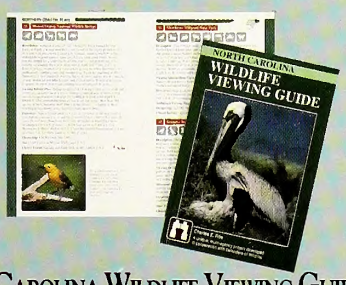
Poster showing all of North Carolina's lizards. One of a series on the state's reptiles and amphibians. 22" x 34"

Item code P3

Birdhouses & Feeders: How to Build and Enjoy Them

An 8-page illustrative guide to building bird houses and feeders.

Item code M6



North Carolina Wildlife Viewing Guide

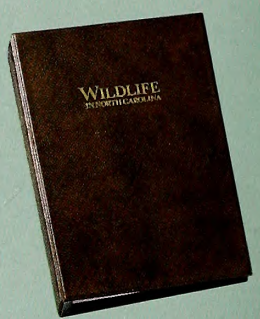
From Cape Hatteras to the Great Smokies, this color guide will lead you to 90 of the state's best wildlife viewing sites.

Item code N6

N.C. *Wild* Store

Wildlife in North Carolina Magazine

Excellent color photography and great articles on hunting, fishing, natural areas, wildlife research and our environment. See our easy-order subscription form on the next page.



Wildlife in North Carolina Magazine Binder

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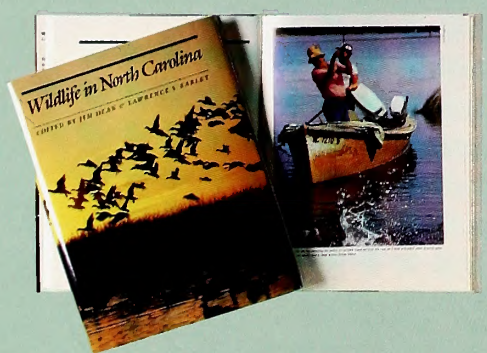

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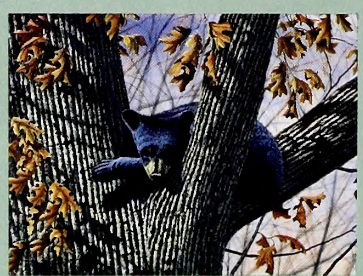

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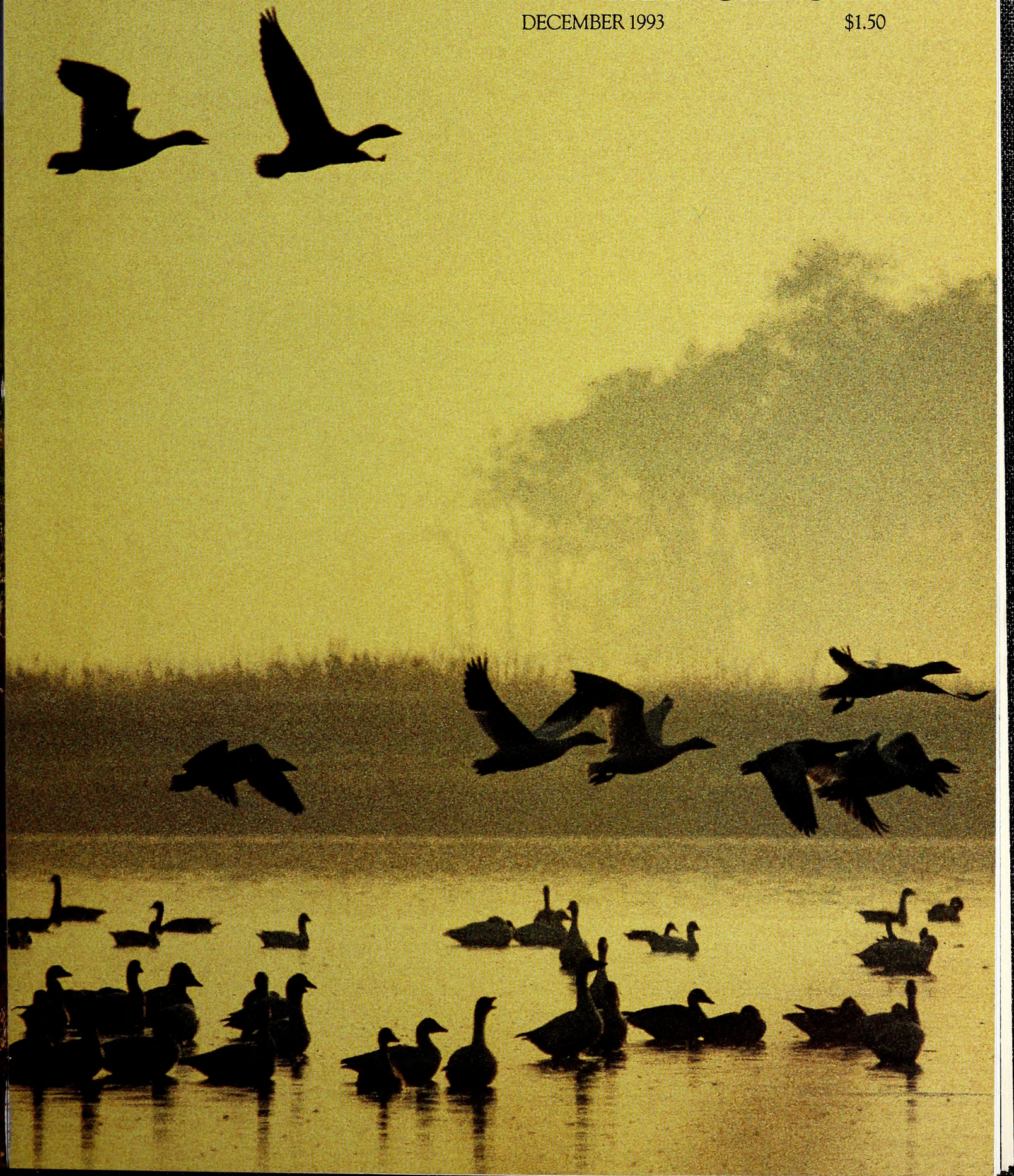

Shading the Future

by Jim Dean

You'd most likely have described the man as spry. Though well into his late 80s, he was lanky and raw-boned with sinewy forearms and the kind of leathery skin that comes from years of hard work outdoors. As I drove up the dirt path to the frame farmhouse, he and his old bird dog came down the steps of the side porch and walked past the leafless pecan grove to an open field in front of the barn and smokehouse. The dog, stiff with arthritis, was barely able to keep up. The two of them were alone, inseparable these last dozen years, but I wasn't surprised to see them looking after things as usual.

It was the kind of late December day that begged for an outside project—temperature in the high 50s, no wind whatever and a brilliant blue sky. The bare pecan trees threw long, black shadows across the carefully raked, sandy yard where they fell in tangles on the white house and roof. In years past, one might have smelled gingerbread or fruitcake baking, but no longer. Like many rural widowers, he lived mostly in the kitchen, but didn't do any fancy cooking. I knew the rest of the house would be closed off, a musty refuge for black horsehair sofas, cold parlor stoves and pictures of long-dead relatives. He wouldn't have decorated a cedar this year, or any other year since his wife died.

JACK DERMID

"Ain't you a bit early to be planting trees?" I said as I got out of the truck. Already, he had set the pots with their spindly twigs where he wanted them, and the first three holes were dug. The young trees were apples, but there was also a white oak.

He laughed and leaned the shovel against a knee to shake hands. "They'll grow," he replied. "Besides, I mightn't have time next March."

We talked about nothing much while he dug a hole, then I took over and dug awhile. "Big hole, now," he instructed. We finished planting and walked back to get the hose. While the water soaked in, we picked up pecans and ate them.

"You know, I'm never going to sit in the shade of that oak," he said unexpectedly.

The remark took me off guard, and a long moment passed while I tried to think of something to say. Then he sighed and cracked another pecan. "But somebody will," he said smiling.

I still drive past that house now and again. There's a young family there now, no kin to my old friend, so I don't visit, but from the road, I can see that the new apple orchard is flourishing, and the white oak looks to be about 15-feet tall. It may be true charity for an old man to plant an oak.

Recently, I have been planting trees at our farm, but my reasons are not entirely pure because I hope to live long enough to see some of them bear fruit. So far, I've planted two peach trees, four sour cherries for pies and preserves, two pears and half a dozen apples in varieties that aren't found in the fruit bins at supermarkets. My willow oaks, maples and red buds are also doing well.

Though most of these trees were bought at local commercial nurseries or through mail-order houses, I have discovered a welcome ally, one that I suspect is not widely known. North Carolina's Division of Forest Resources is a state agency that provides seedlings in bulk for timber production or similar commercial purposes, and the list of available species is impressive. In addition to at least four species of pine and 10 species of oak, there are maples, black walnut, red cedar, Atlantic white cedar, ash, sycamore, yellow poplar, sugarberry, sweetgum, black locust, Fraser fir (for Christmas tree plantations) and baldcypress. There is also a wildlife package of 100 assorted seedlings. These trees are available with few restrictions—no commercial nurseries, no out-of-state sales—and the prices are very reasonable.

My baldcypress cost $10 per 100, and the black walnuts were $26.00 per 100—that's less than you might pay for a single seedling in a nursery. A few species are more expensive, especially Fraser fir, but still a bargain. Those who want to get more information or applications can call Marjorie Allen at (919) 733-2162, or write to the Division of Forest Resources, PO Box 27687, Raleigh, N.C. 27611-7687.

As for me, I've planted the walnuts in two groves, and the cypress in and around ponds. They're growing handsomely, and the 5-year-old cypress are already pushing 10 feet with trunks swelled as thick as a liter Pepsi bottle. On brisk winter afternoons, I can lean on a shovel and visualize how the trees will look in another 10 years, or even 150 when their ragged tops tower over the pond and their knees poke through black water and lilies.

Like my departed friend, I won't see them in their awesome maturity, but somebody will.

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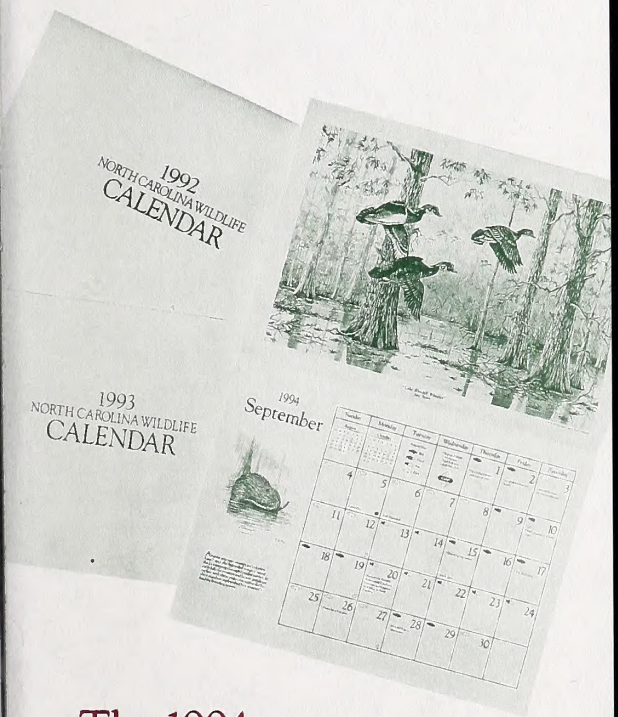

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and also to the environment we share with them.

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Cover *Snow geese gather on Mattamuskeet where they have largely replaced the thousands of Canada geese that once wintered there. Photographed by F. Eugene Hester.*

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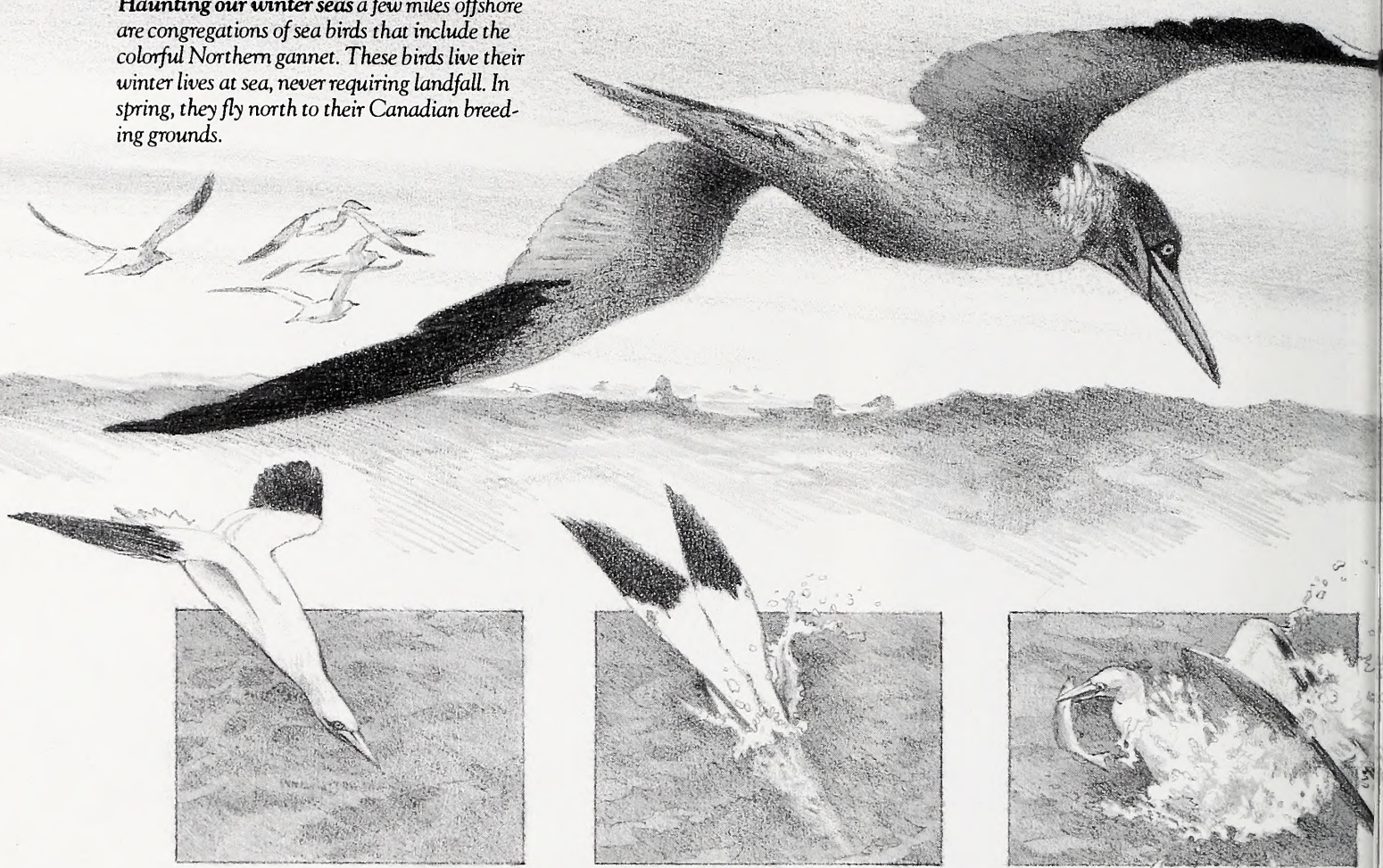
Haunting our winter seas *a few miles offshore are congregations of sea birds that include the colorful Northern gannet. These birds live their winter lives at sea, never requiring landfall. In spring, they fly north to their Canadian breeding grounds.*



Like pelicans, *gannets fish by diving from heights of up to 145 feet and entering the water at speeds of 60 miles per hour.*

As it enters the water, *the gannet pulls its wings together almost like the fletching of an arrow, cushioning its impact.*

Gannets dive *somewhat shallowly, perhaps no more than about 12 feet, but they can swim deeper to catch herring and mackerel.*

Northern Exposure

written by Lawrence S. Earley
illustrated by David Williams

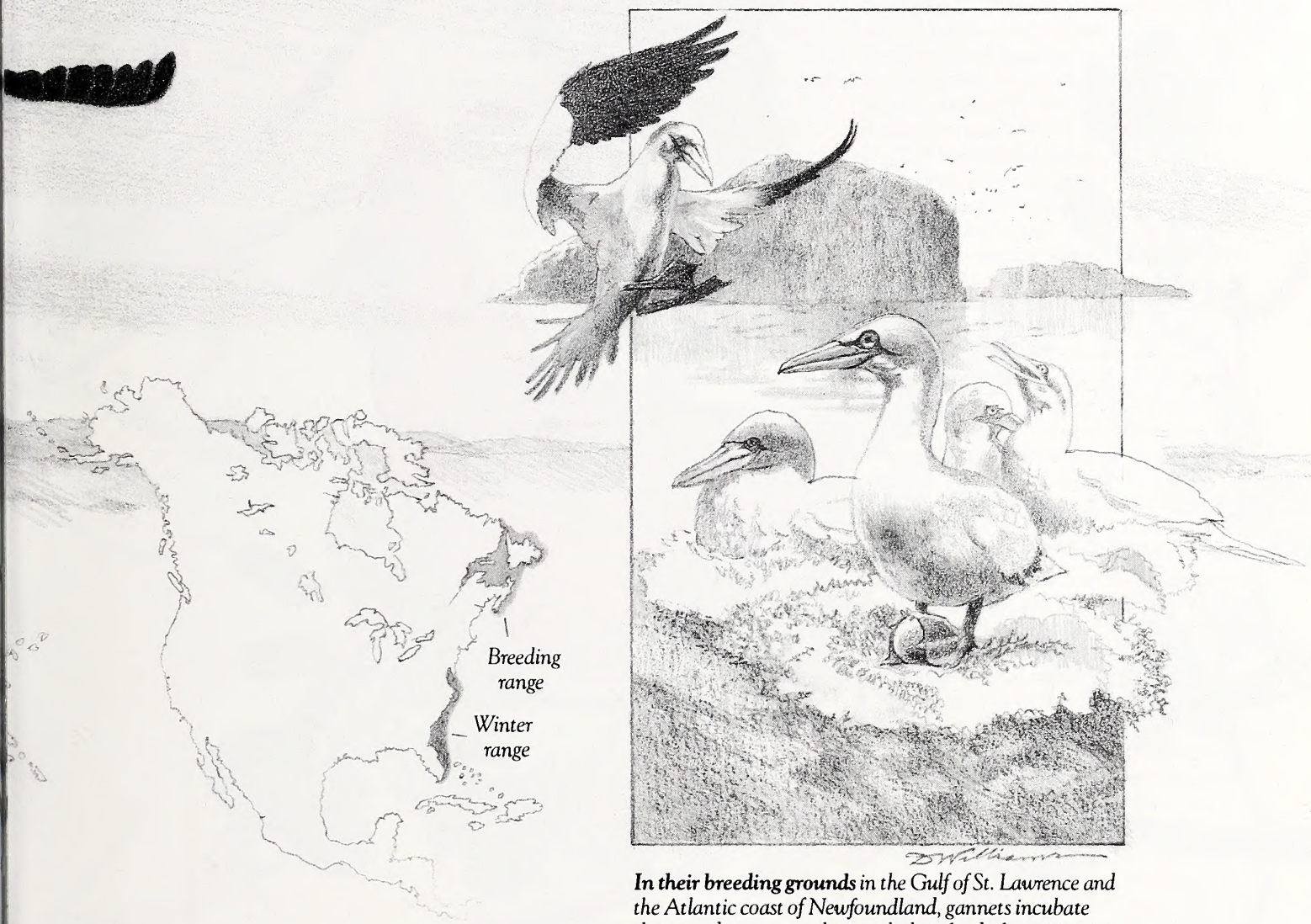
A few miles offshore, sometimes within sight of land but never landing, tribes of seabirds carry on a nearly invisible life on the stormy swells of our winter seas.

One of these seabirds is the North Atlantic gannet, a handsome bird with a buff-colored head, white body and black wing tips. The gannet is one of the largest of the seabirds that appear off our coast in winter, measuring about 35 to 40 inches from the tip of its pointed bill to its tail, with a wingspread of about 6 feet.

Some of the gannet's adaptations are shared by most of the other 300 seabird species in the world—special glands, for example, that excrete excess salt from their bodies; dense layers of feathers that insulate bodies immersed in cold water much of the day.

Other adaptations are peculiar to the three species of gannet worldwide and the *Pelicaniformes* family to which they belong. Like the pelican, the gannet is a plunge diver, dropping out of the sky at speeds of up to 60 miles per hour. With a long, straight bill, a tapered body and special air sacs beneath the feathers of its throat and breast that cushion its fall, the gannet is well-equipped for its breathtaking dives. Just before entering the water the bird folds its wings backward like the fletching of an arrow. Little wonder that the old Cornish word for gannet means "arrow."

The lonely expanse of ocean along the Southeastern and Gulf coasts which is the winter gannet's habitat is a far cry from its intensely social breeding colonies in the north. The western population of the North Atlantic gannet breeds on spectacular



***In their breeding grounds** in the Gulf of St. Lawrence and the Atlantic coast of Newfoundland, gannets incubate their eggs by covering them with their feet before sitting on them. Gannets nest in large colonies in which males and females raise the young. They mate for life. They winter south along the East Coast.*

rocky cliffs in the Gulf of St. Lawrence and on the Atlantic coast of Newfoundland. "The gannet's breeding places are wild and often awesome," writes Bryan Nelson, an English ornithologist who has spent his life studying this magnificent bird. "It is an overwhelming experience to stand on a ledge with gannets on their nests above, below and on each side, the air vibrant with strident calls . . . ."

Gannets mate for life and are faithful to their nest site. Both parents take part in building the nest and both take turns incubating their single egg for about five or six weeks and then feeding the baby bird for another 10 to 12 weeks. Unlike most birds, gannets have no brood patch on their breasts. They incubate their single eggs by covering it with their webbed feet and then sitting on it.

Gannets' nests lie close together in these teeming colonies, just out of reach of each other's pointed bills. For good reason. Gannets have fiercely territorial instincts while on the nest. Any adult gannet wandering through the colony is immediately attacked. Untended young in the nest and young that have fallen out of the nest are often attacked and sometimes killed. To fledge, the young have to work themselves on foot close to the cliff edge and then hurl themselves into the air, but even this important step in species life is contested all the way. Moving awkwardly to the cliff's edge, the darkly plumaged young undergo a gauntlet of vicious drubbing before they flutter weakly to the sea below.

Once fledged, the young must fend for themselves. It's a hazardous time of their lives. Even though 90 percent of gannet young fledge, only about three out of every 10 survive the first year and only 1 in 10 survives to breed. Offsetting this high mortality rate, however, is the fact that gannets live 20 or more years.

Gannets remain off North Carolina's shores until early spring when they return to their clamorous breeding colonies in the cold waters of the far north.

The Kissing Plant

Mistletoe is traditionally tied to the holidays—and to stolen kisses—but how does a parasite generate so much nostalgia?

written by Lawrence S. Earley
illustrated by Anne Runyon ©1993

What I really wanted to know about mistletoe was this: why does it explode so abundantly in one tree—little bushes of it growing from top to bottom—while in a neighbor tree of the same species there's hardly a sprig of it? Why doesn't mistletoe grow with equal vigor in just about every tree, instead of seeming to pick and choose?

I realize that's not exactly what's uppermost in people's minds when they think of mistletoe. Odds are that the first thing you think of at the mention of the plant is Christmas, and not far behind is kissing. Or maybe it's the other way around. Which either shows that I'm curious about insubstantial matters, or that other people are obsessed with sex. Or something.

Indeed, mistletoe is not called the "kissing plant" for nothing. In more innocent times, a sprig of mistletoe hung in the parlor gave blushing young people an opportunity to exchange a quick first kiss, with the blessings of adults who generally indulged in the rite themselves amid general hilarity. Even in these more licentious times, hanging mistletoe in the office or around the home is still an evergreen Christmas tradition.

The origins of this folk tradition lie in the ancient forests of Europe where tribal peoples no doubt noted that as autumn gave way to

winter, often the only greenery left were the shrubby growths of mistletoe high in the trees. How strange and wonderful, they must have thought, that mistletoe, unlike most plants, produced its milk-white berries in the dead of winter. Surely the plant had extraordinary powers. Thus the Gauls of ancient France venerated the mistletoe, as did England's Druids who often sacrificed animals at the base of mistletoe-covered oak trees. The Druids associated this winter-blooming plant with growth and fertility, and medieval herbalists drew on this lore when they prescribed teas and other infusions made from the leaves as antidotes to sterility. By the 17th century the English had domesticated the pagan aspects of mistletoe, making it a gladsome part of their Christmas traditions, and it is this folklore that we draw upon in hanging mistletoe in the home today.

Bah, humbug! This Christmas tradition business is all very colorful, but let's get back to the subject at hand—why mistletoe seems to pick and choose the trees that it grows on.

To find the answer I turned to an expert on plant pathology at N.C. State University, Dr. Larry Grand. That's "plant pathology" as in *pest*, *parasite* and *disease*. It may come as a shock to discover that with all its holiday, spiritual and even sexual associations, mistletoe is in reality a parasite, living freely off the tree's tissues and unable to do otherwise. Like other obligate parasites, it's got a pretty good deal, deriving its water and sometimes its food from the "labors" of its host and giving back nothing in exchange.

Yet, gentle hearts, don't look askance at the mistletoe for its indolence. The true mistletoe common to North Carolina doesn't generally hurt the tree. Botanists refer to it as a "water parasite," says Dr. Grand. "It's green and has the capability of producing almost all of its own food through photosynthesis. What it basically gets from the tree seems to be primarily water."

The only time it can be dangerous is when the tree is stressed in times of drought. Then heavy infestations of the plant, all sipping at the tree's internal fountains, can do the tree serious harm. A far deadlier mistletoe species, the dwarf mistletoe, native to the West, robs both water and nutrients from its host, reducing the tree's growth rate and possibly even killing it. This mistletoe species is a serious threat to southwestern conifer forests.

Besides, our kinder, gentler mistletoe has an important place in the forest as a source of food for birds. Mistletoe and birds have co-evolved so that birds do the job of disseminating the mistletoe's seeds. Birds eat the berries and the seeds pass through the birds' digestive tracts unharmed, deposited wherever the birds happen to roost, generally in trees. The seed germinates, sending its roots into the xylem of the tree.

Ancient peoples were well aware of the intimate association between birds and mistletoe. The word mistletoe, according to one explanation, derives from the Anglo-Saxon word *Misteltan*, with *Mistel* coming from a word meaning dung and tan from a word meaning twig. "Dung twig," in other words, a particularly vivid way of referring to the natural process by which mistletoe is spread.

Yet if birds spread mistletoe, why don't they spread it democratically? Why don't you see it just about everywhere that birds roost?

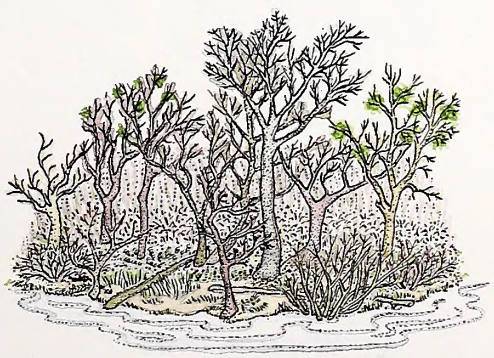
Larry Grand shrugs, responding with a depressingly familiar scientific phrase, something about "not being clearly understood." What he says exactly is: "There is a certain amount of host specificity which is not clearly understood." Meaning that mistletoe will grow on some tree species, but not on others. Which gets us back to my question: *why?*

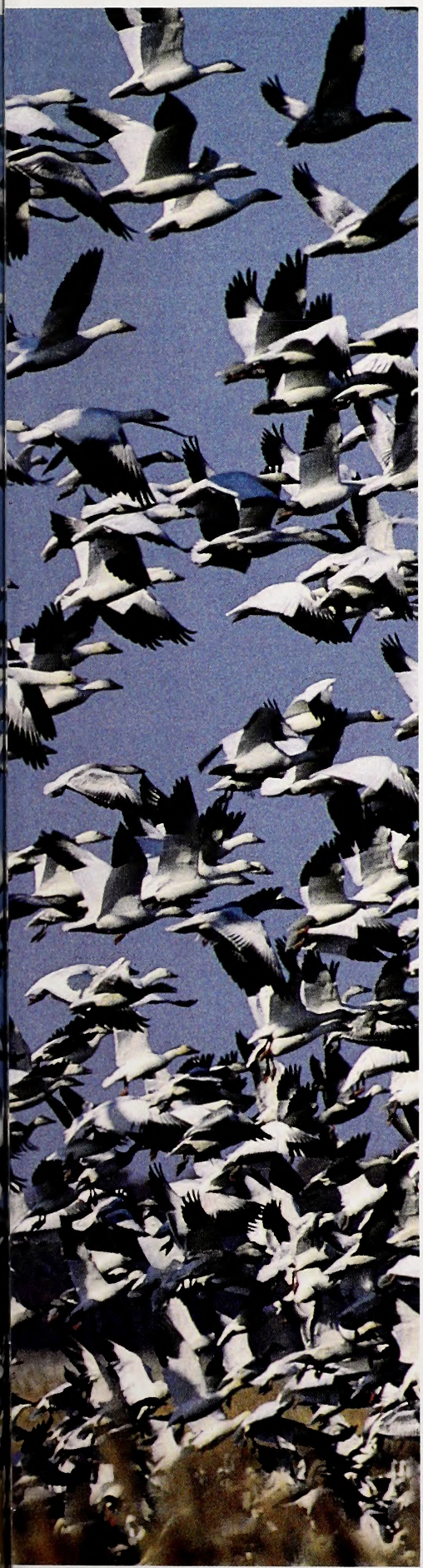
Grand steers away from this question like a man avoiding a dark alley late at night. "Probably a more interesting question is why mistletoe occurs in certain tree species in certain areas, and in other species in other areas," he says. On the campus of N.C. State in Raleigh, for example, Grand has seen it associated with red maple, scarlet oak, northern red oak, willow oak and blackjack oak. Down East, however, it seems to be more associated with water tupelo, red gum and red maple.

"It's a phenomenon that's well-known in plant pathology," he goes on to say, "a matter of recognition—the plant that the parasite is trying to attack either has something that enables the parasite to be successful, or it doesn't have it and it's unsuccessful."

So a tree, basically, is either receptive or unreceptive to mistletoe—for reasons that are unknown. In a roundabout way it brings us back to kissing, doesn't it? The kissing plant is rejected or accepted by the tree, for what reason? Who knows? Who can explain true romance? Isn't it always just a matter of chemistry?

I should probably leave the matter there. That's what happens when a fevered imagination takes hold of a Christmas tradition like mistletoe—it leads you in directions you never suspected. Merry Christmas, anyone? ☐





EUGENE HESTER

Snowed Under

The vast numbers of Canada geese that once wintered in North Carolina have largely shifted their cold-weather homes farther north, but some 20,000 greater snow geese have taken their place.

by Eddie Nickens ©1993

A bitter wind bore down across a Pasquotank County field of winter wheat, freezing the muddy furrows and drainage ditches to concrete consistency and turning to ice the drops of sweat that splattered on my shotgun receiver. Ten minutes to sunrise and already the wind tore at our decoys, hundreds of white plastic grocery bags that ballooned out behind thin green garden stakes, ripping them out of the ground and sending them spiraling across the fields. The wind ripped holes in my paper-thin, disposable, white Tyvek® chemical-handling suit and my teeth rattled. The sweat I'd worked up while carrying gun, shells, cameras, a flashlight (in my mouth) and a fair share of 500 bag decoys, decoy heads and decoy sticks was now sucking off any body heat not whisked away by 30 miles-per-hour gusts. The flat palm of a corporate farm landscape stretched for miles to the horizon, the sky flecked with tundra swans rising from the Pasquotank River to feed in the fields. I was as happy as one could be—if one was hunting the greater snow goose.

For centuries, the term "goose" in North Carolina has meant the honker, the Canada goose. Historically, these geese have etched lines in the autumn sky and covered Mattamuskeet's shallow waters. But as the number of wintering Canadas has plummeted in the state, the population of great snow geese has, over the last 100 years, rocketed skyward. Hunters and wildlife watchers alike are reaping that harvest of snows. Certainly no other sight can thrill the heart of a birdwatcher like a flock of 5,000 snows settling into a winter marsh. And perhaps no other gamebird is the subject of such grandiose schemes and the provider of such consternation to hunters as this relatively recent addition to the North Carolina's waterfowler's bag.

Somewhat smaller than the Canada goose, the snow goose is unmistakable in the field or in the air. The birds are all-white, except for pink legs, a pink, serrated bill with a black grin patch, and the telltale black primary feathers on mature birds. When feeding in a dead-brown marsh, the brilliant white bodies are visible for over a mile, especially when a feeding mass of geese comprises a flock measured in acres. In the air, snows show off their stove-black primary feathers, like formal black gloves pulled over each wingtip. Unlike Canada geese, snows rarely fly in well-formed Vs. Instead, they flock in an undulating mass of squiggles and Us and small groups, like tiny white pearls thrown across a brilliant winter-blue sky. And they are as unmistakable to the ear as they are to the eye, keeping up a din of yelps and barks

***The population of** greater snow geese has skyrocketed from fewer than 3,000 birds to more than 400,000, and some 20,000 winter in North Carolina.*

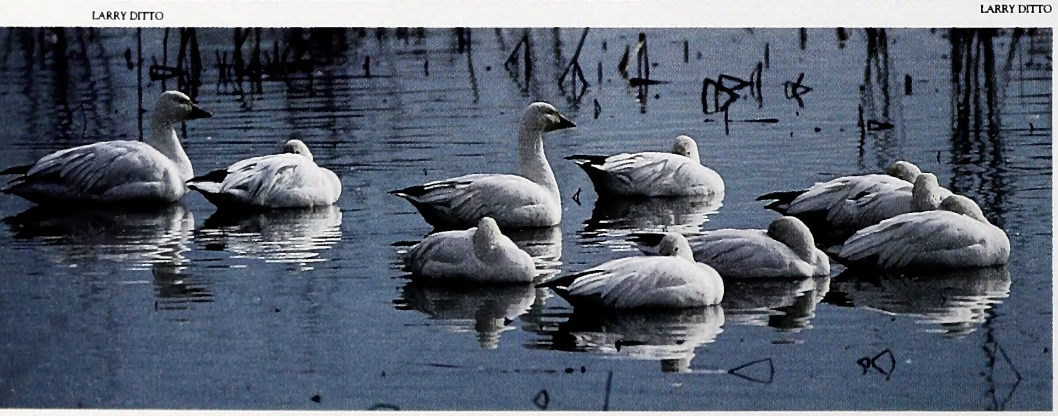
LARRY DITTO

Mature snow geese *are white with black wingtips; however, the young are often a mottled gray and may occasionally be mistaken for blue-phase lesser snow geese. There are very few of these "blue" geese among the greater snows.*

like a pack of high-strung terriers.

There are two subspecies of *Anser caerulescens*: the lesser and the greater snow goose. Both races occur in North Carolina, but the greater snow goose (*A. caerulescens atlantica*) is by far the most prevalent of the two arctic breeders in our state. In the field it is difficult to tell the lesser snow goose from the greater, but in the hand, the longer bill and overall larger size is a clue. The other taxonomic difference between the two is the near-total lack of "blue-phase" geese among the greater snow goose population. "Blue" snow geese, characterized by a dark gray body, are almost always lesser snow geese, although immature greater snow geese also often have a gray-blue coloration.

For those who've developed an affinity for these gregarious, showy birds, these are years of great promise. The population of greater snow geese has skyrocketed in this century



LARRY DITTO

Snow geese rest *in a calm backwater of Lake Mattamuskeet at dusk (above). These geese are now far more common here than Canada geese. Greater snows often travel in huge flocks, covering fields (right) and eating winter wheat and other crops.*

from a low of some 2,000 to 3,000 birds at the turn of the century to a current flock of some 400,000. And while North Carolina seems to be hosting a smaller and smaller percentage of wintering birds, clouds of snow geese spiraling above the Pea Island marshes are still a near-daily sight in mid-winter. Hunters are offered a lengthy season and generous bag limits.

To fully appreciate the greater snow goose, you must turn to the north. Not to the famed—and beleaguered—prairie potholes that dot the Canadian border and foster most of our continent's mallards and teal, but farther north, above the boreal forest, across the Arctic Circle and 500 miles farther yet, to the soggy open tundra that cloaks the islands of the northeastern Canadian arctic. There, on Baffin and Bylot and Northern Ellesmere islands and along the coast of northwest Greenland, less than 1,000 miles from the North Pole, the greater snow goose returns each brief summer. Here, 2,000 miles from its wintering grounds in North Carolina, the greater snow goose returns to lay three to five eggs on a tussock of mud and grass. It is the only North American goose population to breed exclusively within the Arctic Circle.

Greater snow geese arrive on the breeding grounds as soon as the snow melts in June. The birds nest in closely packed colonies that sometimes number in the hundreds of nests, preferring sites within a few miles of the coast. By late June, all eggs have been laid; three-and-a-half weeks later, the nestlings emerge, and the race to flight before early winter begins.

The breeding and young-rearing seasons in these arctic regions are short—averaging a mere six weeks, and they often begin late or are abruptly ended by an early freeze. While other waterfowl species might "double clutch," or replace one unsuccessful nest with a new brood, reproductive organs in the snow goose begin to shrink soon after eggs are laid. If spring comes too late to the goose's breeding grounds, or if winter returns early, an entire breeding population can fail.

By late August, as the first bitter winds move south from the North Pole, the colonies of snow geese becomes restless. At first, just a few birds stretch their wings and begin the 2,000-mile flight to the south, but soon the flock gathers—it is time to leave. Within a few days, the entire greater snow goose population will be in the air. The birds cover the St. Lawrence River between Quebec City and Riviere-du-Loup, turning it white. From there they fly cross-country to the shores of New Jersey and the Delaware Bay, then trace the Atlantic Coast to Virginia's Back Bay and the estuaries of North Carolina, covering hundreds of miles in a single flight.

In North Carolina, birds begin to fleck the waters of northern Currituck Sound in late November, ranging inland farther and farther as the season progresses. Armed with strong, serrated bills, snow geese historically have fed by pulling up the entire root and rhizome systems of marsh vegetation, primarily *Spartina* and *Scirpus* grasses. In the marshes of Delmarva wildlife refuges, this has led to serious habitat damage, but in recent years, the birds have begun to make heavy use of agricultural fields. In North Carolina's coastal plain, snow geese often feed in harvested grain fields, but when they descend upon a field of winter wheat, farmers get nervous, and hunters seeking permission to hunt snows are finding more and more open doors. Already the greater snow goose has become a sought-after trophy for North Carolina gunners, and experienced hunters will tell you that this particular goose is no longer an easy target despite its vast numbers.

Though hunters in Quebec and Inuit subsistence hunters in the northern arctic have gunned the birds throughout the 20th century, hunting greater snow geese was banned

EUGENE HESTER

LARRY DITTO

Greater snow geese *are certainly at home in snow, though they seldom encounter it in eastern North Carolina. They are well-adapted to the cold, however, nesting in the open tundra of the Canadian arctic.*

in the United States from 1932 to 1974. When the season reopened, many gunners reported quick and easy success. Atlantic Flyway harvests of greater snow geese rose from 9,200 birds in 1975 to 26,400 in 1991, with a season high of 40,400 birds in 1983.

As the geese have become more wary, it has become more and more difficult to close a snow goose hunt successfully. Harvest figures for North Carolina hunters have fluctuated wildly over the years, but a downward trend is certainly evident. In 1991, some 1,400 greater snow geese were harvested by Tar Heel gunners. That can't compare to the heady days of the late '70s, when snow goose harvest figures for North Carolina hunters hovered between 5,000 and 10,000.

The good news is that, as hunter success has fallen, the season has lengthened. This year, hunters in North Carolina have 107 days to hunt snow geese, with a bag limit of five birds per day. Still, it's a rare gunner who can ever boast of a limit.

"They are not very vulnerable to hunting pressure," says Dennis Luszcz, waterfowl project leader for the N.C. Wildlife Resources Commission. He points out that snow geese typically travel in large flocks that number in the thousands, and they are accustomed to seeing lots of movement in the feeding flocks. Those are conditions difficult to emulate in the field.

"Snow geese are used to sharing a meal with 10,000 other birds," says my friend Dixon Herman, who plans to offer guided goose and swan hunts in eastern North Carolina this winter. "They don't need to land with 700 decoys to feel comfortable. It's not like four or five ducks seeing a spread of two dozen decoys. The numbers don't translate. A spread of 500 decoys is pocket change to a snow goose."

That may be true, but it doesn't keep Herman and others from trudging across frozen fields like human Clydesdales, dragging sleds of decoys. The most important part of snow goose hunting in eastern North Carolina, Herman says, is done in his truck, scouting the broad expanses of corporate and

private farmland for the telltale white smear across the distant landscape. It is crucial to hunt the particular fields the geese are using to forage, Herman stresses. "Not the field beside it, or near it, or close to it," he says, "but you want to be in the very field they were in yesterday."

Herman and his cronies use up to 700 decoys, a mixed bag of homemade and commercial silhouettes, plus hundreds of white grocery bags knotted over a thin, two-and-a-half foot stake. The slightest breeze fills the bags with air and bounces them around like feeding geese. Bunched in small "family" groups of three to a dozen decoy bodies, the spread is set in a large elliptical pattern, with a hook or spur on the downwind side. Unlike many other species of waterfowl, snow geese have no hangups about flying over their brethren, so gunners are often spread out within a flock. Calling seems to make little difference, Herman reports. What's more important is knowing when to shoot.

"We've learned to take whatever geese we can get," he says. "Often there will be 1,000 geese in the air, led by a breakout group of a half-dozen or so. You know if you wait 10 seconds you'll have your pick of 1,000 birds; but in 10 seconds that first flock will have flared, and so will every bird in the sky. You're better off pulling the trigger."

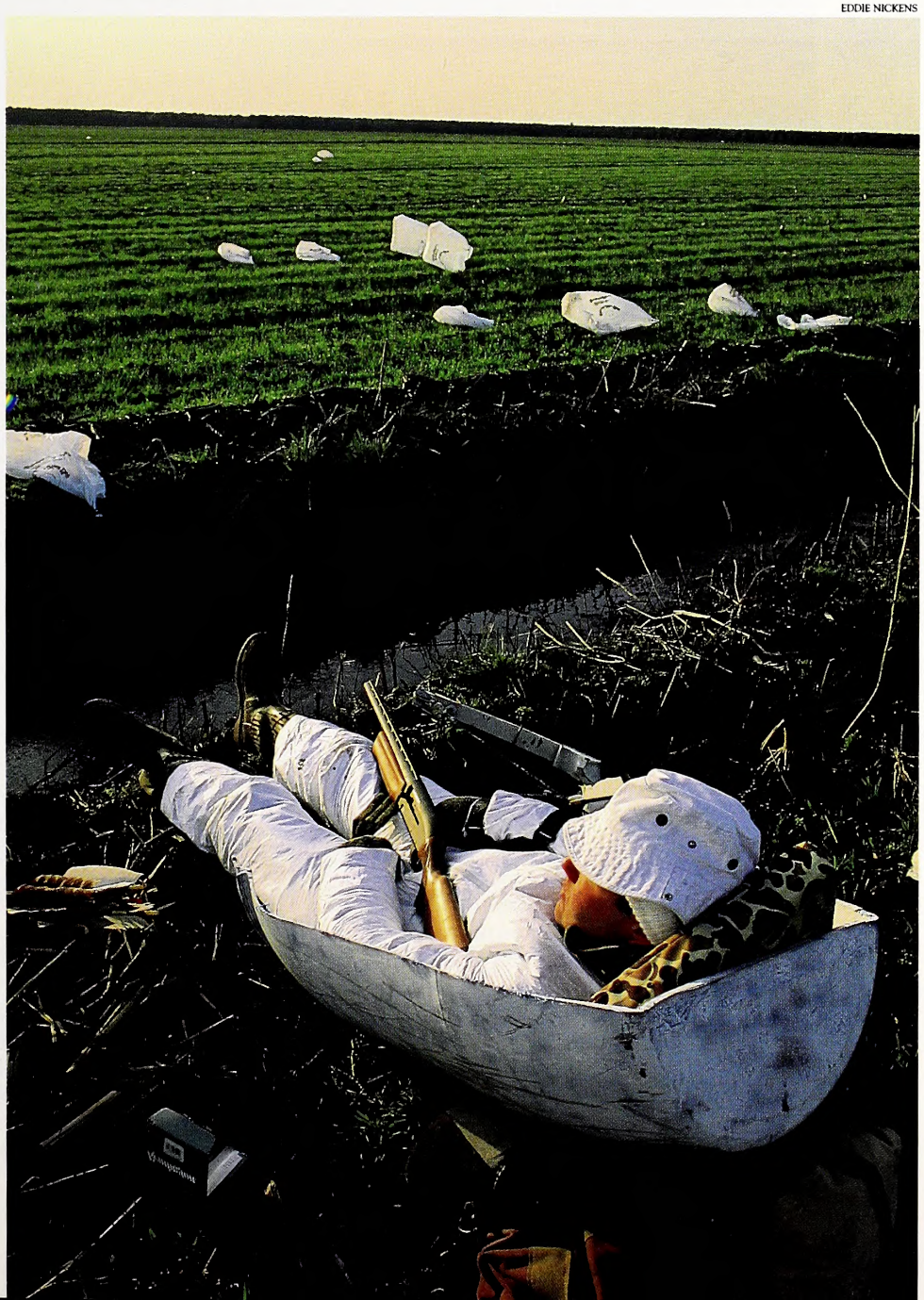
Another proven tactic is to glass distant goose flocks as they feed across a field. The feeding flock is in near-constant motion, and as the geese move up and down the field, birds in the rear of the flock take to the air and leap-frog over the group's leading edge. No doubt, they are tired of hunting for scraps after several thousand others have gleaned the best pickings. Eventually birds in the flock's new caboose grow weary of the picked-over field and retake the lead. That behavior has tipped off more than a few hunters who sneak down drainage ditches and wait for the flock to leap-frog within range.

Still, North Carolina hunters have it easy compared to snow goose gunners of the Canadian persuasion. At Cape Tourmente on the St. Lawrence River, horse-drawn sleighs ferry hunters to pit blinds dug into the extensive mud flats of the estuary, where clumps of mud covered with white paper serve as decoys.

Such tactics are hardly required of those who limit their goose hunting to the use of binoculars or camera. Though the number varies widely due to changes in breeding success, some 20,000 greater snow geese winter in North Carolina, and public lands in the Coastal Plain are commonly awash with snow geese during the winter months. The Knotts Island area generally hosts the greatest number of birds, but Pea Island, Lake Mattamuskeet and Pungo national wildlife refuges are standouts as well. Avid birders might want to glass Mattamuskeet and Pungo lakes for a small flock of 3,000 to 5,000 lesser snow geese that have taken up winter residence there for many years.

By mid-February, the first snow geese take leave of North Carolina for the arduous journey to the far North. After all, to a bird that breeds above the Arctic Circle, any day with highs above freezing has to feel balmy. By late March, only a few stragglers remain, but soon they too will stretch their black-tipped wings and set a northward course, beginning the strange and magnificent journey to arctic islands still locked in ice.

As for my frigid day at Pasquotank, I can report that we waited for distant geese to join us. And we were still waiting in vain hours later. I can also report that this is not the first time I've gone gooseless. Yet it is always a thrilling spectacle to see all those geese. Sometimes, even, up close. ⚀



***Since the season reopened** in 1974, greater snow geese have become very wary and annual harvests by hunters have dropped. More sophisticated tactics are needed that include careful camouflage. White plastic bags mounted on sticks catch the wind and make good decoys.*

EDDIE NICKENS

Grandfather Mountain, framed by beech trees, from McRae Meadows. Avery County.

Images of Wildness

From the mountains to the sea, North Carolina has never looked better than it does through the camera lens of this Asheville native and Skyland school teacher.

written and photographed by George Humphries ©1993

Photographer George Humphries covered a lot of territory to get the pictures that appear in his first book, *North Carolina: Images of Wildness*. His odyssey took him to some well-known places such as the Cape Hatteras Lighthouse and Linville Gorge, but he's also focused on natural areas not often visited by the restless tribe of nature photographers. Favored by Humphries' discriminating eye are little-known Tulls Creek in Currituck County, the Big Swamp River in Robeson County and Pettigrew State Park.

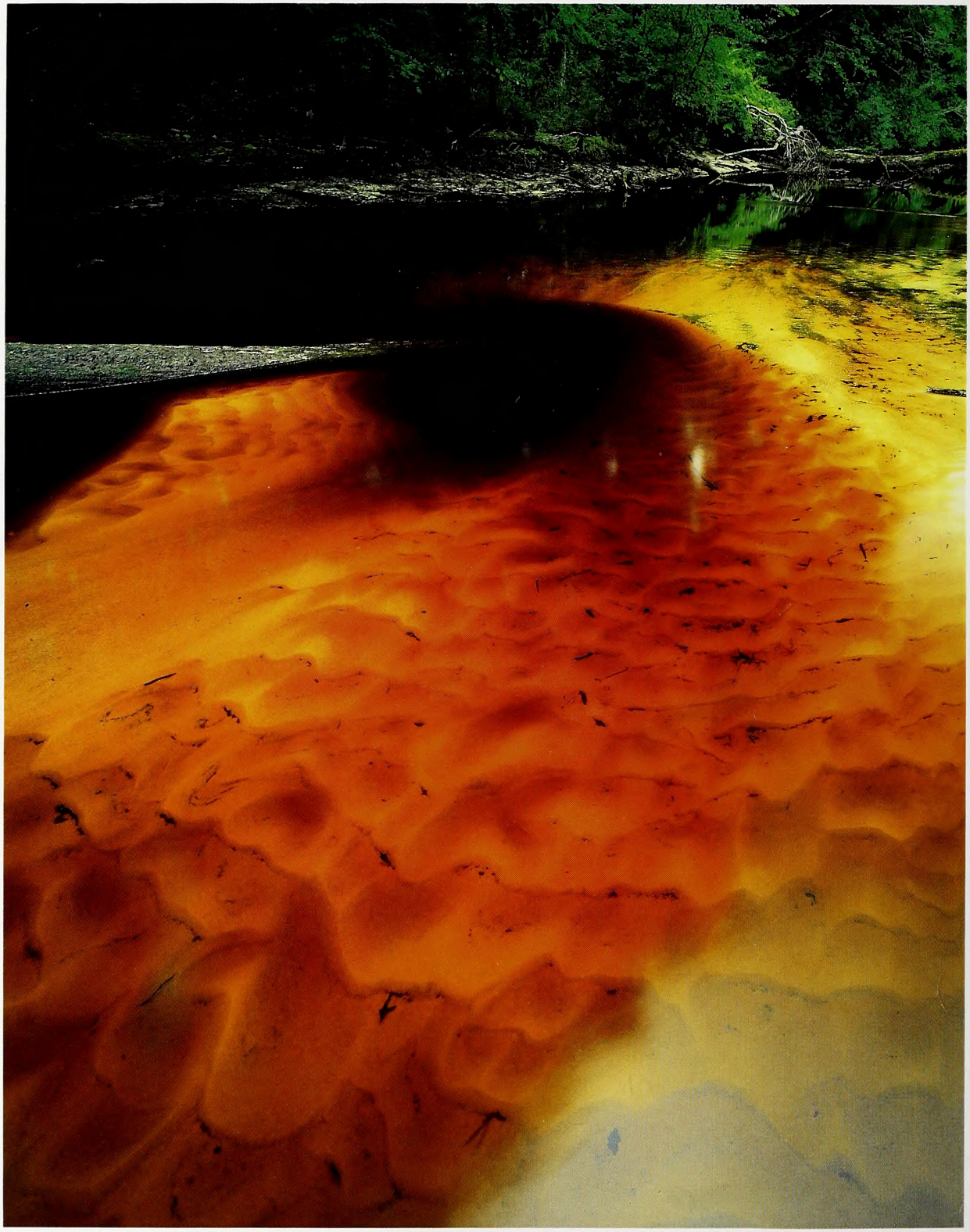
In all his photos, however, it's the quality of the light in a striking natural landscape that he seeks. "Nature has been at work in North Carolina for a long time," Humphries says modestly about his work, "and we cannot improve upon her labors."

For 10 years the Asheville resident has crisscrossed the state to produce the 110 color photos in his book. Carrying a heavy pack containing his large-format Linhof camera and lenses, Humphries has climbed mountains, hiked forest trails, waded marshes and tramped beaches. A connoisseur of light, he's waited for the morning sun to illuminate mountain tops and river bottoms.

The photo feature in the pages that follow present only a small selection of George Humphries' photos, accompanied by his own words. We hope you enjoy these views of the wild from a master North Carolina photographer.

Linville Falls, Linville Gorge Wilderness, Pisgah National Forest. Burke County.

Beautiful clinging snow had fallen in the gorge the night before I took this picture. During the six or seven hours I hiked the rim, I never saw another person in the gorge. To get the perspective of the falls that I wanted, I squirmed down an icy descent to a snow-covered rock outcrop. With 65 pounds of camera equipment, it was difficult and dangerous. But all my fears faded and my heart was filled with wonder as I looked down on this snow-covered scene.



Big Swamp River. Roberson County.

It was hot and humid the day I photographed this scene. The water was the lowest I had ever seen it, so I waded the stream most of the way. In this scene I tried to capture the essence of black water rivers. There is an enchantment about the rivers and swamps of the Coastal Plain that cannot be found anywhere else.

**Pothole, South Toe River.
Yancey County.**

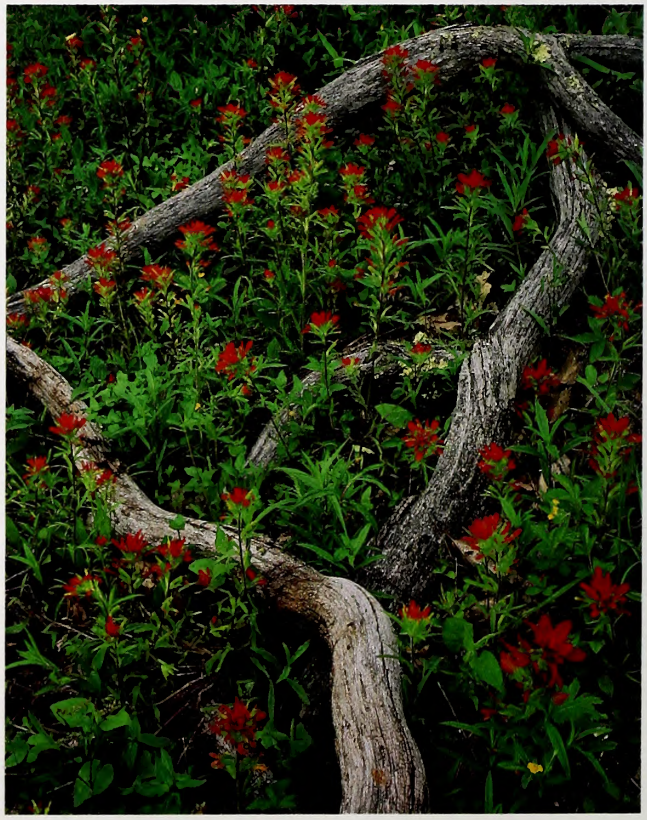
Nature creates infinite combinations of patterns, shapes, textures and hues, all of which can be a source of inspiration and wonder and many of which lie beneath our feet. Often when we take a closer look we gain a much deeper understanding of the world around us. In this scene the delicate beauty of maple and beech leaves and the abrasive action of the South Toe River, which scoured this pothole over the millennia, remind us of the creative energy and power of nature.

**Richland Balsam Mountain.
Haywood County.**

With the sun sinking fast, I only had a few minutes to capture the ethereal glow of a winter sunset on mountain ash and Fraser firs, with a gibbous moon rising. I was using a Linhof Technika camera (4x5) with Fujichrome 50 film.

Cypress slough. Currituck County.

I rose at 5 a.m. to take this picture. I had hiked around this slough the day before, considering the photographic possibilities. I decided that this composition would be more appealing in dawn or sunrise light. As the sun began to rise over the slough, a golden glow streamed through the foggy mist creating nuances of light reminiscent of Rembrandt's paintings. Viewing this scene on the ground glass of my view camera was magical.



Great Smoky Mountains National Park.

I often look for photographic themes that symbolize the cycle of life, death and renewal. This stand of Indian paint brush blooming amid decaying oak limbs caught my eye in the Great Smoky Mountains.

Black Balsam Knob. Haywood County.

Rock outcrops are key elements in many of my landscape compositions. Ancient, monumental and powerful, they are evidence of the mighty forces that shape the land. I look for shapes, lines and textures that reveal a geologic story and provide interesting foreground. After I took this scene, the wind died and the last light filled the western sky. In the twilight amid the sparkle of the stars, I recognized the faint red glow of Mars.

Core Sound. Carteret County.

I love the first light of a calm day reflected in the placid waters of the sounds and sloughs along the North Carolina coast. As I framed this scene, I was oblivious to the hundreds of mosquitoes and greenhead flies that swarmed around me. The moment was so beautiful it seemed timeless. Only the cries of the gulls and seabirds reminded me that it was fleeting.

Grandfather Mountain, looking toward Beech Mountain. Avery County.

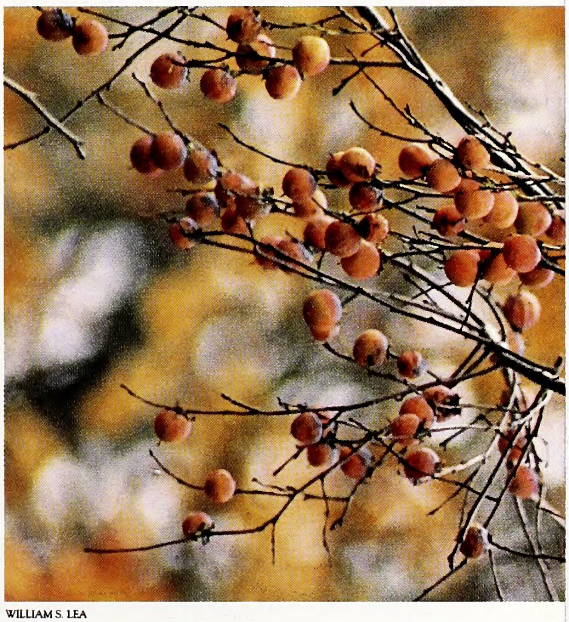
When I view this composition, I remember how cold it was that day and how the wind cut right through me. I had to take my gloves off to adjust the tripod and focus the camera. It was so cold my fingers stuck to the metal of the tripod. But that same cold and wind had sculpted this beautiful snow design on that ancient rock face.

Photography by George Humphries, from the book North Carolina Images of Wildness, *published by Westcliffe Publishers, Englewood, Co. Available at local bookstores or directly from the publisher by calling 1-800-523-3692. $32.95 hardback; $22.50 softback.*

Shake Them 'Simmons Down

Despite its notorious "pucker factor," the persimmon is a cherished food for wildlife. Humans, too.

by Janet Lembke ©1993



WILLIAM S. LEA

The succulent-looking *persimmon berry can be delicious when it's very ripe or when cooked in various recipes. Woe the mouth, though, that bites into an unripe berry. Its infamous astringency is caused by tannins in the berry.*

For 10 months of each year, from winter into autumn, the common persimmon is a modest tree. Here, in my home territory on the lower Neuse, it grows abundantly but unobtrusively, sequestering itself at wood's edge or in the hedgerows amid loblollies and sweet gums, wax myrtles and sumac. Oh, it does command brief attention in spring, in small part because of the delicate come-hither fragrance of creamy white blossoms. Much more noticeable, though, is the sheer loudness of a persimmon when it blooms. For a solid week, the tree hums, drones and buzzes. The reason for the din is bees of course—hordes of bees visiting the blossoms to gather nectar and go about their unwitting business of pollination. But when this short season has faded, the flowers gone and all the noisy nuptial celebrants flown away, the tree again retires from public notice.

Till October, that is. Then, ripening fruit begins to blaze in the hedgerows; amid the glossy, dark green leaves, the fat red-orange berries (as a proper botanist would call them) smoulder and flare like live coals. And into November, well after the last leaf has fallen to the ground, those berries still burn on the branches, glowing now with the darker warmth of ash-dusted embers.

What happens next is told in a good, old-timey Southern song, a bouncy reel tune better known for its chorus of "Bile them cabbage down" than for its many verses chronicling the adventures of such creatures as raccoon and possum, jaybird and frog.

Possum up a 'simmon tree,
Raccoon on the ground,
Raccoon say to the possum,
"Won't you shake them 'simmons down?"

But I usually can't wait past Halloween to put myself in possum's role and give the local 'simmon trees a mighty shake. Nor is it necessary to wait for a hard frost before the berries ripen. Hereabouts, they may be ready—watch for softening and changes in color—from the onset of October through December.

The objective, of course, is good eating. Fresh persimmons, persimmons baked into bread or cookies—sumptuous treats! And when I gather them, I'm simply one of the latest in a long line of gatherers who have eagerly harvested persimmons along the banks of the lower Neuse for something like the last 8,000 years. Here, the prehistoric inhabitants of this rivershore, people who were forerunners of the tribes later known as Neusiok, Coree and Pamlico, must have savored that special wild sweetness. It's a safe bet that, October through January, they shook down those sugar-packed 'simmons whenever they had a chance. They surely ate some of their bounty on the spot and may have saved the rest for pulping and mixing with crushed corn to make a kind of bread.

Nor was it especially hard for those early gourmets to locate the succulent berries. The common persimmon (*Diospyros virginiana*), is common indeed. Frequenting the high places and the low, it consorts with pines and palmettos here on the sandy, salty, flat-as-a-flounder coast and, just as easily, with oaks, maples and rhododendrons at cool Appalachian elevations of up to 3,500 feet. The tree may be found throughout North Carolina and, indeed, throughout the entire southeastern quadrant of the United States, with outer limits in central Pennsylvania and central Illinois. It is native to North America, along with a kissing cousin, the Texas persimmon (*D. texana*). That cousin, found in Mexico as well as in the

Persimmon trees *are common throughout North Carolina and the southeastern United States. The fruit—a berry, actually—ripens on the trees during the fall and early winter.*

Lone Star State, bears small, black, edible berries, which may also be used as a source of natural dye. (But beware the black persimmon; it stains face, tongue and teeth as readily as it colors fabric.) Both Texas and common persimmons generally come in sexually differentiated versions; they are, as the botanists would say, dioecious, with clusters of small male blossoms found on one tree while the larger, solitary female blossoms occur on another. (And the traffic of airborne bees is concomitantly loud and heavy as they buzz between one and the other.)

The world's persimmons—there are several hundred species—all belong to the Ebenaceae, the ebony family; and their genus, *Diospyros*, is not only large but far-flung, growing for the most part in the tropics or in temperate zones with long, hot, sultry summers. Woodworkers have long prized the family for its close-grained, night-dark heartwood. But, though the persimmons are as strong and black-hearted as any other ebony, their frequently small girth exempts them from being turned into golf-club heads or parquet floors.

In the eating department, the oriental persimmon, *D. kaki*, may be one of the best known of the bunch. Native to central and north China, it has journeyed eastward across the Pacific with great success. Commodore Matthew Perry, who opened trade with Japan, brought the first seeds to the United States in 1856. Nowadays, varieties of the *kaki* persimmon are not only grown commercially on the West Coast but are abundantly available to backyard orchardists through local nurseries and garden catalogs.

It seems not quite reasonable to apply the word "berry" to a fruit as voluptuous as that of the *kaki* tree—fruit to which the hybridizers have now given a wonderment of shapes and colors, from oblate spheres of rosy gold to orange globes containing chocolate flesh to plump tomato-red cones. Whatever the variety, all *kaki* persimmons have the smooth skin and palm-filling heft of a nectarine. All make the common persimmon, which is no bigger than a cherry tomato, look like a piker. And, quite apart from their handsome size, some Oriental varieties—not all, but a goodly number—possess a significant advantage over their puny American relatives—a total, blissful absence of the pucker-factor.

That infamous astringency is caused by tannin, the substance that makes acorns bitter. And it was remarked in the early 17th century by Capt. John Smith, who provided the first description in English of the common persimmon—indeed, of any species of persimmon. In a brief but fully packed section of his *Generall Historie of Virginia, New-England, and the Summer Isles*, published in 1624, he listed the "things which are naturally in Virginia"—the flora, the fauna, and the uses to which they were put by the native Powhatan Indians. And he adopted the word of this Algonquian-speaking tribe as the common name for a tree then quite unknown in England and the rest of Europe. (The "Medler"—medlar—with which he compares it bears an edible fruit that resembles a crabapple.)

> *Plums there are of three sorts. The red and white are like our hedge plums, but the other which they call* Putchamins, *grow as high as a* Palmeta: *the fruit is like a Medler; it is first green, then yellow, and red when it is ripe; if it be not ripe, it will draw a mans mouth awry, with much torment, but when it is ripe, it is as delicious as an Apricot.*

In the hope that this New World marvel might be naturalized, Capt. Smith took "Putchamins" home to England. The name for the species, *virginiana*, commemorates the origin of these first specimens to reach the British Isles. But in that cool and foggy climate, though the tree itself will leaf out and flower, the fruit more often than not fails to ripen and stays most stubbornly in the stage of sheer torment.

Less than a century later, English-speaking tongues had turned the word *Putchamin* into Persimmon. The modern name was used for the tree and its berry by John Lawson, surveyor general to the Lords Proprietors of the Carolinas, in his 1709 book, *A New Voyage to Carolina*. In a chapter detailing the natural history of North Carolina's "Summer-Country," Lawson not only included the common persimmon among the fruit and nut-bearing trees on his list of "Vegetables"—his general term for all plants—but, echoing Capt. Smith's comparison, also devoted considerable space to outlining the persimmon's versatility. Nor was he reluctant in his admiration, finding virtue even in the pucker-factor.

> Persimmon *is a Tree, that agrees with all Lands and Soils. Their fruit, when ripe, is nearest our Medlar; if eaten before, draws your Mouth up like a Purse, being the greatest Astringent I ever met withal, therefore very useful in some Cases. The Fruit, if ripe, will presently cleanse a foul Wound, but causes Pain. The Fruit is rotten, when ripe, and commonly contains four flat Kernels, called Stones, which is the Seed. . . .*

According to Lawson, persimmons were also good for more than pursing mouths and cleansing wounds. He observed and described an Indian game "with the Kernels..., which are in effect the same as our Dice, because Winning or Losing depend on which side appear uppermost, and how they happen to fall together." (I can also imagine using persimmon seeds, which frequently number more than four per berry, for a game of Tiddlywinks.)

From sweet fruit to ebony heartwood to seeds used in play, it seems that every part of the plant except for the skin may be put to some human use. Even the leaves, picked in summer, may be dried and brewed into tea with the root-berry flavor of sassafras. But many people cannot bring themselves to think of the fruit as food, much less as a delicacy. The unripe berry's fearful astringency has kept the persimmon stuck firmly in the category of things not to be messed with.

Take heart. There are two ways to beat the pucker-factor. In the matter of fresh fruit, the easy way out, of course, is to shun the common persimmon altogether, be it wild or cultivated, and to find a backyard orchardist who can supply a non-astringent variety of the Oriental *kaki*. But brave and adventurous souls (who may not have time to search the hedgerows or the woods) might choose to plant a domesticated variety of *D. virginiana*. Though their unripe berries will cause a sure-fire, full-strength case of torment, these tame trees often have two advantages over the reclusive hedgerow stock. First, they are self-pollinating (though, for the greatest set of fruit, it helps to plant more than one tree). Then, the fruit grows as plump as an apricot, twice the size of its wild counterpart.

Patience, however, is the key to success in eating any variety of common persimmon in its fresh state. Wait until the berries are thoroughly "rotten." If they offer the slightest firmness when touched, they are not ready. But when the skins seem filled with an almost liquid mush—rejoice and bite in, catching the sugar-sweet juice as it runs down your chin. What, though, if those berries can't be touched, what if they're growing way up there out of reach? No need to by-pass pleasure. Obey raccoon's command to possum—give that tree a shake. Immature fruit clings to the branches while fruit that is ready comes tumbling down.

The second way to dodge the pucker-factor is to cook the persimmons. Only unripe fruit that's eaten raw can purse a mouth or draw it awry. But even if some immature berries have sneaked into a batch of otherwise "rotten" persimmons pulped for cooking, stove-heat will banish every last trace of astringency.

For people who fancy nutrients along with flavor, persimmons rate high as a natural source of iron, potassium and vitamin C. For me, persimmons define the word "ambrosia." Fresh or cooked, they're a food truly fit for the gods. *Diospyros*, the name of their genus, attests to that. The Greek term may be translated as "Zeus's staff of life." To that, I can only add a happy Amen. ☒

Janet Lembke's latest book, Dangerous Birds *(1992) is published by Lyons & Burford, and is available at bookstores for $21.95.*

Eat Them 'Simmons Up

When raccoon shinnied down the 'simmon tree and stationed himself immediately below, it's likely that he acted out of self-interest—getting first go at the fruit that possum was shaking to the ground. Likely, too, that enough honey-sweet berries were left for possum to get a fair share. Both critters, though, had to grab while the grabbing was good. People are more fortunate: We can eat our persimmons and have them, too. Here's how.

Persimmon Pulp

Extracting pulp is a quick, almost effortless process.

- Wash the persimmons, be they tame or wild.
- Place a colander containing the fruit over a bowl, and mash the fruit with a sturdy spoon. The pulp falls readily into the bowl, while skin and seeds are left behind.
- The pulp may be used immediately, or it may be frozen. Because the short persimmon season does not always coincide with a wish to bake, I usually opt for freezing. Pint-sized plastic freezer boxes—two cups—make ideal containers. The frozen pulp may be safely stored for up to three months.

Persimmon Bread

This recipe, received from a friend who fancies wild persimmons, makes two loaves of a dark, moist bread that rises very little; an inch of dough may puff to an inch and a half. If you can resist the temptation to eat the finished product all by yourself, it makes an out-of-the-ordinary homemade gift. Because it freezes well, the bread may also be saved for special occasions.

INGREDIENTS:

2 cups persimmon pulp
1 ¾ cups flour
¼ teaspoon baking powder
1 teaspoon baking soda
¾ teaspoon salt
1 cup sugar
2 eggs, slightly beaten
½ cup cooking oil
1/3 cup raisins
½ cup chopped walnuts or pecans
½ teaspoon cinnamon
½ teaspoon nutmeg
2/3 cup water

Mix all ingredients together. Divide the resulting dough evenly between two loaf pans.

Bake at 350 degrees for one hour, no more. As noted, the bread will be moist, not cakey, after it is baked.

Persimmon Cookies

A neighbor four houses downriver uses the kaki-type of persimmon for these drop cookies, which she prepares according to the following recipe, clipped some years ago from The Washington Post. *But those of us dedicated to gleaning the local hedgerows find complete satisfaction in using wild fruit.*

INGREDIENTS:

1 cup persimmon pulp
1 teaspoon baking soda
1 cup sugar
½ cup butter
2 cups flour
1 egg
1 teaspoon cinnamon
½ teaspoon salt
1 cup pecans, chopped fine
1 cup raisins, chopped fine
¼ cup water, to be added *only* if dough is stiff

Blend persimmon pulp and baking soda. Beat the egg lightly and add it to this mixture.

Cream the sugar and butter.

Mix the dry ingredients together. Then combine them with the sugar and butter, pulp, baking soda and egg.

With a teaspoon, drop the dough onto a greased baking sheet. Bake at 350 degrees for 12 to 15 minutes, until light brown.

Yield: 4 dozen cookies

Persimmon Pudding

Pity the possum, pity the 'coon, both limited to the fruit they can shake from the branches. They never had a chance to taste this honey of a dessert. The following instructions appear in Down East Recipes, *a collection made in 1982 to benefit the sadly no-longer-extant Sea Level Health Care Team. The book features traditional offerings from this part of the North Carolina coast.*

INGREDIENTS:

2 cups persimmon pulp
3 eggs
1 ½ cups sugar
1 ½ cups flour
1 teaspoon baking powder
1 teaspoon baking soda
½ teaspoon salt
2 cups whole milk
½ cup melted butter
1 cup raisins or nuts
½ teaspoon cinnamon
½ teaspoon nutmeg
1 teaspoon vanilla

Combine all ingredients. Pour into a lightly greased baking dish.

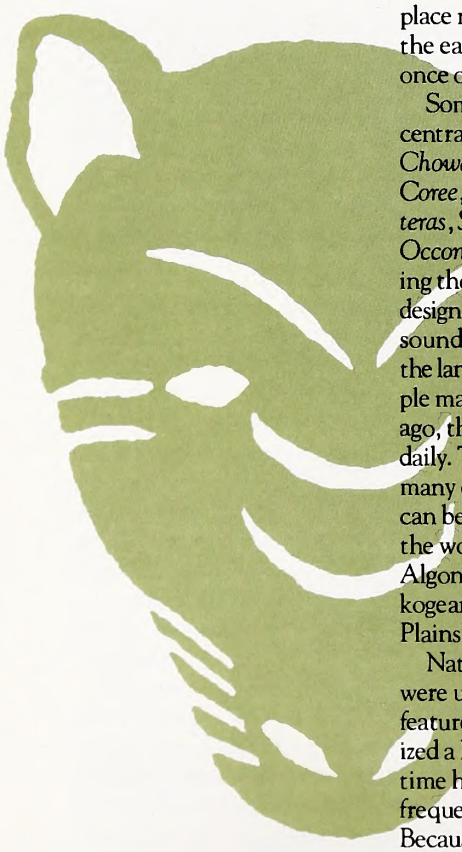
Bake uncovered at 325 degrees until firm, about one hour.

Serves six moderate eaters, or four of the sort with a raging sweet tooth.

from Hatteras *to Hiwassee*

All across North Carolina, Native Americans have left a permanent legacy in the names of many towns, rivers and other places. Here are but a few of them.

by Brooks Tenney ©1993



When Europeans first visited North Carolina, they found inhabitants in virtually every corner. From wind-swept outer banks to craggy western peaks, the Tar Heel state was inhabited. Today, part of western North Carolina is still home to the Cherokee people and many of the place names found there reflect Cherokee origins. In the east, however, few tribes remain of those who once occupied the land that Europeans "discovered."

Some of the first tribes to be encountered in east-central North Carolina included the *Pasquotank*, *Chowan*, *Matchipunga*, *Catawba*, *Pamlico*, *Neuse*, *Coree*, *Tuscarora*, *Woccon*, *Saura*, *Keyawee*, *Eno*, *Hatteras*, *Shoccoree*, *Perquimans*, *Saxapahaw*, *Waxhaw*, *Occoneechee*, *Tutelo* and *Saponi*. The words designating these tribal groups are spoken every day—as the designations for cities, counties, rivers, sounds and lakes. Even though the languages of most of these people may have fallen into disuse long ago, their echoes remain as place names that we use daily. These early occupants described their land and many of their words remain. Sometimes the origins can be traced; in other cases, scholars can only link the word with major language families, such as Algonquian (tribes of the Eastern seaboard), Muskogean (Southeastern tribes) or Siouan (Central Plains tribes).

Native American place names, as originally applied, were usually descriptive. They designated natural features—or the plant or animal life that characterized a location. Sometimes the changes wrought by time have negated the meanings of such words but frequently the meanings remain vivid and accurate. Because of this attribute, the interpretations of these ancient designations are of interest to those who love nature, wildlife and the out-of-doors. This brief collection of North Carolina's Native American names can be found on many highway maps of the state.

Algonquian

ALLEGHENY (County)

Possibly from the Algonquian (*Lenni Lenape*) word *welhik-hanna*, or *oulik-hanne*, meaning "fine river," or "beautiful river."

APPALACHIAN (Mountains, Trail)

In Creek, *appalachee* means "people on the other side." The name was first applied to the Eastern mountain range by a French explorer in 1567.

CHEOAH (Mountains)

Believed to stem from a Muskogean language, possibly Creek, meaning "mountains" or "highlands."

CHEROKEE (Indian Reservation, National Forest, Town)

Cherokee called themselves *ani yunwiwa*, meaning "principal people." Other tribes, notably the Catawba, called them *tsalagi*, or *tsalaki*, which evolved into *Cherokee*, a word interpreted to mean, "people who speak another language." Over time, the Cherokee adopted this name for themselves.

The Cherokee Reservation (or Qualla Boundary) is located in western North Carolina. At Cherokee, the Cherokee Museum and Culture Center displays authentic exhibits of culture and history.

CHICAMACOMICO (Village)

Algonquian. "Big water town." Listed in the National Register of Historic Places, this former Outer Banks lifeboat station may have borrowed its name from a river in Maryland.

CHINQUAPIN (Town)

Algonquian, from *chincomen*, designating any of several varieties of chestnut tree (genus *Castanea*) or the edible nuts that were gathered from them. The first published reference to the *chinquapin* came from Capt. John Smith in 1612.

"They (the Indians) have a small fruit growing on little trees, husked like a Chestnut, but the fruit most like a very small acorne. This they call Checkinquamins, which they esteem a great daintie."

CHOCOWINITY (Town)

From *chocawanateth*, possibly meaning "fish from many waters." The town took its name from a small creek nearby.

COINJOCK (Town)

"Land of the blueberry swamp." Indians preserved blueberries by drying or charring. The berries could also be mixed with nut galls to produce a blue-gray dye. Today's cultivated blueberries are derived from the native highbush blueberry found in swamps, in high upland meadows, and along the fringes of bogs.

COWEE (Valley)

Cherokee. From the name for an ancient village, "Wolf-clan place."

Cullasaja
(Town)
Cherokee, meaning "honey-locust place." The Cherokee satisfied their need for sugar by the use of maple sap, honey and pods from the honey-locust tree.

Cullowhee
(Town)
Cherokee. Possibly from *tsula*, meaning "kingfisher."

Currituck
(County, Sound, Town)
"Wild geese place." Currituck Sound and the adjoining marshes have been famous to generations of sportsmen as great spots for geese, ducks and swans. Long before white men arrived, Indians hunted and fished in this sportsman's paradise.

Hyco
(Reservoir, River)
From the Saponi language. *Hico-ott-mony* means "turkey buzzard creek." John Lawson observed, "The Turkey Buzzard of Carolina is a small vulture, which lives on any dead Carcasses. They are about the bigness of the Fishing Hawk and have a nasty smell with them."

Culla-*saja*

Kuwahi
(Mountain)
Cherokee. *Kuwahi* means "mulberry place." Mulberries were valued by early wild-food gatherers. The name designates one of the high peaks in the Smoky Mountains, near Clingman's Dome, close to the Tennessee border. While the white mulberry is an import, brought into this country based on an interest in the culture of silkworms, the red mulberry (*Morus rubra*) is a native plant. It is distributed broadly across the South.

Hickory
(Lake, Town)
In Algonquian, *pawhiccora* was the name for a dish made from pounded hickory nuts and water. This spelling dates from 1618. By 1670, the name, as spelled today, had attached to the tree. Native Americans made nut butter by using boiling water to separate the oil from crushed hickory nuts.

Hiwassee
(Lake)
Cherokee. "Meadow" or "savannah."

Hominy
(South Hominy; Town)
Algonquian; from *rocka-hominy*, meaning "parched corn." *Hominy* is one of many Native American words relating to corn that have become well-established in American-English speech. Others include *maize*, *pone*, *samp*, *succotash* and *shuck*.

Mattamuskeet
(Lake, NWR)
From a tribal name; believed to mean "bad dust" or "much dust."

Nolichucky
(River)
Cherokee. "Place of the spruce trees."

The *Nolichucky* River flows north and west to join the French Broad River.

Manteo
(Town)
In 1584, Sir Walter Raleigh dispatched the *Tyger* and *Admiral* to the sandy coast of North Carolina. The small vessels explored the area for about two months before departing. On their return trip, they carried two of the first Native Americans to visit Europe. In the narrative of discovery penned by two captains; they recorded, "We brought home two of the savages, being lusty men, whose names were Manteo and Wanchese."

Nantahala
(Lake, Gorge, National Forest, River, Town)
Cherokee for "place of the middle sun" or "place of the noon-day sun." The name may have originally applied to the steep gorge that keeps out all but noon sunlight.

Moyock
(Town)
From the name for a chief. Locally, the name is interpreted to mean, "place of the oak on the trail." The name designated a white settlement in 1753. From the creek at Moyock, small craft could reach the Northwest River and Currituck Sound.

Oconaluftee
(River)
Cherokee. "Beside the river." Once, the name probably designated an ancient village. Today, the Oconoluftee Visitor Center is located at the northern entrance (on Route 441) to the Cherokee Indian Reservation in western North Carolina.

Ocracoke
(Island, Town)
Algonquian. This Indian name once designated a village at the south end of *Ocracoke* Island. It is designated on an early map drawn by John White in 1585 as *Wocco-cock*. It sometimes appears on other early maps as *Wocon*, or *Wokokin*.

Ocracock, Occacock, Occocock

Proposed interpretations have included "bend," "curve" or possibly, "enclosed place" or "fort."

Today the name for this Carolina fishing village still shows up in a variety of spellings—*Ocracock*, *Occacock*, *Occocock*. A popular (but preposterous) local story attributes the name to the pirate Blackbeard in the year 1718. An impatient Blackbeard stalked the deck of his ship all night waiting for the day to signal the beginning

of what was to be known as the Battle of *Ocracoke* Inlet. He knew that the cock's first crow would start the action, and in his impatience, cried out "O Crow Cock! O Crow Cock!"

PUNGO
(Canal, Lake, National Wildlife Refuge, Town)

"Sand fly." In Algonquian, *po-en-gu-uh means* "gnat." In some places, gnats are still called "ponkies." Variants of this name appear in several Eastern states.

po-en-gu-uh

PAW PAW
(Ridge)

The *paw paw* or *papaw* (*Asimina triloba*) is a small fruit tree, a member of the custard apple family (*Annonaceae*), a fruit whose other family members are all found only in the tropics. This tree ranges from Texas and Florida in the south as far north as Michigan and as far west as Nebraska. Paw paws have been described as tasting like a mixture of bananas and pears. In "A New Voyage to Carolina," published in 1709, John Lawson noted, "The Papau is not a large tree. I think I never saw one a Foot through; but has the broadest Leaf of any Tree in the Woods, and bears an Apple about the Bigness of a Hen's Egg, yellow, soft, and as sweet as any thing can well be. They make rare puddings of this fruit. The Apple contains a large Stone."

PASQUOTANK
(County)

"Tidal, divided river." The Pasquotank was a subtribe of the Wampemeoc people who spoke an Algonquian dialect. When the first white men came, the Pasquotank occupied the north shore of the Albemarle River.

PASQUOTANK

ROANOKE
(Town)

Roanoke, or *roanoak*, was the name given to a form of shell money made from beads of several types. One shell used to make *roanoak* was the marginella, a type of snail. Near coastal regions, clams, mussels and other mollusks were used to make *roanoke*, also known as *peak* or *wampum*. The Matchipungo tribe living in Virginia in the early 1600s was well known for its manufacture of *roanoak*. Sir Thomas Dale sent Ralph Hamor to request Powhatan's youngest daughter to be his bride. Powhatan responded that he would be unable to comply. Hamor's journal recorded the chief's reply. "I have sold her within this few daies to a great werowance (tribal chieftain) for two bushels of rawrenoke (roanoke) three daies journee from me."

SALUDA
(Town)

"River of cornfields." Lawson's journal recorded, "The Indian Corn or Maiz, proves the most useful Grain in the World; and had it not been for the Fruitfulness of this Species, it would have proved very difficult to have settled some of the Plantations in America. It is very nourishing, whether in Bread, sodden or otherwise."

SCUPPERNONG
(Town)

Algonquian. From *askuponong*, for "place of the magnolias," a name given to the Scuppernong River valley of North Carolina. The name, first used around 1811, was later applied to a variety of wild grape that grows in the area.

SEQUOYA
(Mountain)

Sequoyah, or *Sikwaya*, (1779-1843), a Cherokee, invented an 85-syllable alphabet for the Cherokee language that was adopted by the Cherokee Nation in 1821. His name was applied to the giant redwood trees of the Pacific coast (as a genus name) in 1847 by a Hungarian botanist.

SWANNANOA
(Gap, Town)

Cherokee. From *Suwali-Nunna*, or *Suali Nun Naki*, "trail of the *Suwali* (Cherokee or Cheraw) tribe." Ethnologist John Swanton links this name to the *Cheraw*, a Siouan tribe occupying part of South Carolina at the time of De Soto's visit. Their name, *Suwali*, has been spelled in a score of different ways, including *Xuala*.

SUWALINUNNA

TUCKASEGEE
(River)

Cherokee. From *tsik-sitsu*, meaning "crawling terrapin," possibly in reference to the sluggish flow of this river.

Swannanoa, just east of Asheville, is in Cherokee country.

TUSCARORA
(Town)

From *ska-ru-re*, the name for a North Carolina tribe, meaning "hemp gatherers." The name related to their use of Indian hemp (*Apocynum cannabinum*), a plant of the dogbane family. Fibers of the plant were used to make thread, cloth and clothing. Other portions of the plant were used to make emetics, cathartics, and a variety of medicinal and narcotic compounds.

In the early 1700s, the Tuscarora petitioned the Iroquois of New York for land to avoid incessant strife with encroaching white settlers. Their migration across Virginia, Maryland, West Virginia and Pennsylvania, to reach New York, left a score of Tuscarora names along their route.

Unaka
(Town)
Cherokee, meaning "white," from white rock formations in the area.

Watauga
(County)
Cherokee. The exact meaning is uncertain but interpretations include, "river of plenty," "beautiful water" and "river of islands."

Wananish
(Ghost Town)
From *oananish*, meaning "little fish." *Wananish*, located near the shore of Lake Waccamaw in Bladen County was named by a local sportsman. All that remains is the highway sign.

WACO

Waco
(Town)
From the name for a southern tribe. Several other explanations have been put forward for this word including Seminole *waco*, meaning "little blue heron;" or *tawakoni*, meaning "river bend among red sand hills."

Wakulla
(Town)
Creek for "loon." Loons are at home in both fresh and salt water. A salt gland above each eye helps them to modify their physiology in response to the environment. In comparison with other marine birds, a loon's bones are dense, enabling them to dive to depths of 200 feet for durations of five to 10 minutes. These powerful flyers have been clocked at speeds up to 80 miles per hour. In his list of Birds, John Lawson noted that "two kinds" of loons inhabited North Carolina.

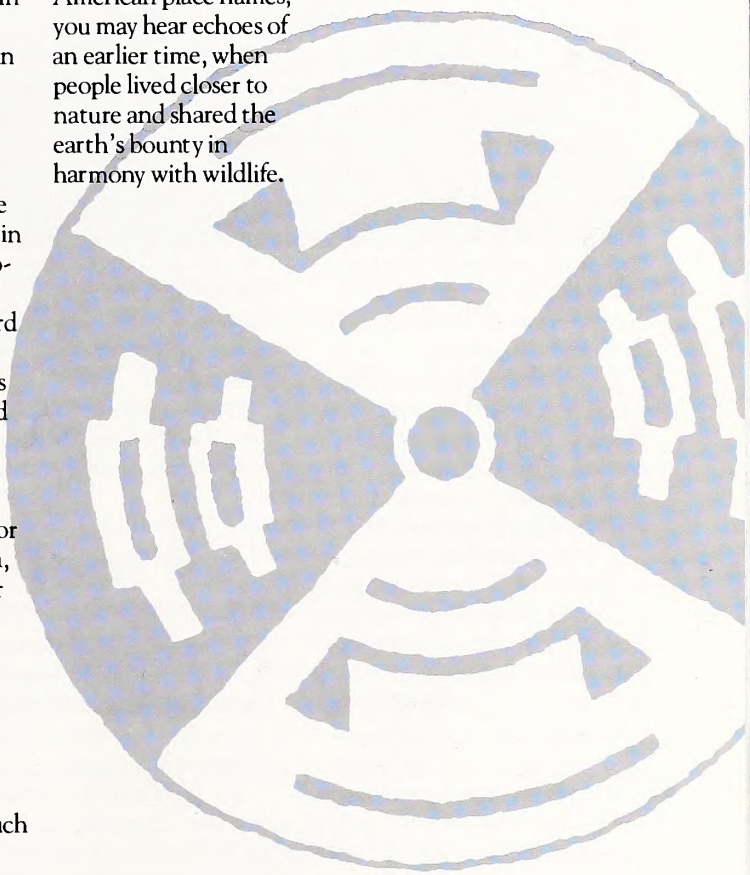
Wayah
(Bald, Gap)
Cherokee. "Wolf." In addition to Wolf, the seven clans of the Cherokee included Deer, Bird, Long Hair, Wild Potato, Paint and (the color) Blue.

Yadkin
(County, Falls, River, Town, Valley)
From the name for a small tribe living on the river of the same name; possibly from a Siouan word, sometimes spelled *yattken*, or *yattkin*, meaning "big tree" or "place of big trees." The name for both the river and the tribe was recorded as *Yattken* in 1674. According to John Swanton, the Yadkin probably spoke a Siouan language, relating this tribe to the Catawba, rather than the Cherokee. Sometimes Native American place names that originated in other places were introduced into North Carolina without regard to their original meaning. These names may have been selected for their sound (Tomahawk, Sioux, Wenona, Saratoga) to commemorate events or places (Sioux, Saratoga, Kennebec) or to honor noted leaders and warriors (Junaluska, Wanchese, Tsali, Sequoya, Osceola). Usually introduced by non-Indians, these names include such North Carolina places as *Arapahoe* (a Pawnee name, meaning "trader" or "blue sky men"), *Pensacola* (Choctaw; "people of the long hair"), Etowah (Cherokee, or Creek, meaning "village" or "tribe"), *Milwaukee* (Algonquian, "a good place"), *Nebraska* (Omaha, or Otoe, meaning "flat, spreading water") and *Tuskegee* (Choctaw, "warrior.")

Arapahoe

In some instances the meanings for early names have been lost (Stecoah, Croatan, Ahoskie, Pee Dee, Hatteras, Waccamaw or Uwharrie) and, sometimes, even the experts disagree. (Uwharrie was recorded as "Heighwaree" by John Lawson when he visited in 1700.) But if you listen carefully to the sound of North Carolina's Native American place names, you may hear echoes of an earlier time, when people lived closer to nature and shared the earth's bounty in harmony with wildlife.

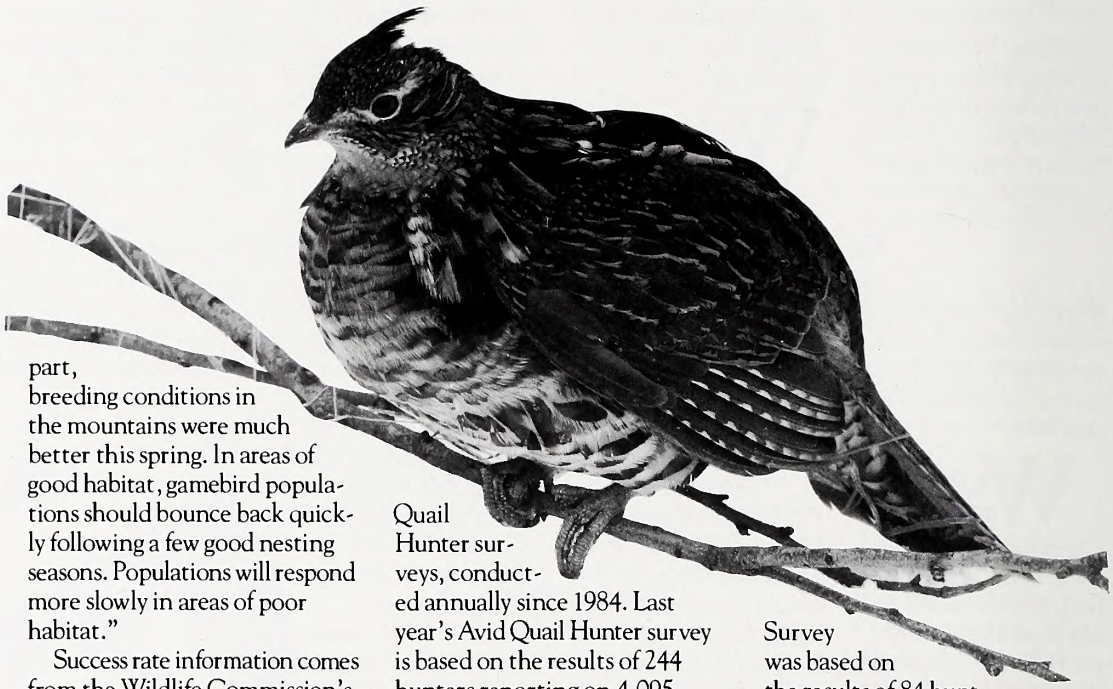
Waccamaw



Poor Breeding Season Blamed for Grouse Decline

Quail Populations Up, Grouse Down in 1992-1993 Season

Written and Edited by Vic Venters



Last season, quail hunters enjoyed slightly improved hunting throughout much of North Carolina, while ruffed grouse hunters saw their success rates plummet.

Flush rates for grouse dropped 25 percent in the southern mountain region, and plunged 34 percent in the northern mountains. Statewide, hunting parties averaged flushing four birds per trip last season, a drop from an average of 5.4 grouse flushed per trip in the 1991-92 season.

On the other hand, quail populations improved last year in the Piedmont and in the northern section of the Coastal Plain. In the Piedmont, cooperators averaged flushing 2.74 coveys per trip, a 23 percent improvement from 1991-1992. Northern Coastal Plain hunting parties averaged flushing 2.41 coveys per trip, a 7 percent increase from 1991-1992. However, quail hunting success dropped for the third consecutive year in the Southern Coastal Plain, where parties averaged 1.65 coveys per party per trip. Quail hunting success also dropped slightly in the mountain region.

Biologists can estimate grouse and quail populations trends by tracking avid hunter success rates. They blame cold and wet weather in the spring of 1992 for contributing to a very poor breeding season for all ground nesting birds in the mountain region—including grouse, quail and wild turkeys.

"All indications are that there was a very poor nesting season in the mountains last year," said Terry Sharpe, the N.C. Wildlife Resources Commission's small game project leader. "For the most part, breeding conditions in the mountains were much better this spring. In areas of good habitat, gamebird populations should bounce back quickly following a few good nesting seasons. Populations will respond more slowly in areas of poor habitat."

Success rate information comes from the Wildlife Commission's Avid Grouse Hunter and Avid Quail Hunter surveys, conducted annually since 1984. Last year's Avid Quail Hunter survey is based on the results of 244 hunters reporting on 4,095 hunts. The Avid Grouse Hunter Survey was based on the results of 84 hunters from 1,421 hunts.

Not as Rare as Once Thought

Biologist Finds Greensboro Crayfish in Other Locations

Because of the efforts of a N.C. Wildlife Resources Commission biologist, the Greensboro burrowing crayfish may need a new name.

During his survey, nongame biologist Chris McGrath discovered that the crayfish is more common and widely distributed than previously thought. Prior to McGrath's study, the Greensboro burrowing crayfish was known to exist in only one location in a residential neighborhood in downtown Greensboro.

McGrath, however, found the crayfish at 17 of 36 locations in an area from Greensboro to Lexington and southeastward to the Uwharrie National Forest. The study was part of a survey initiated by the U.S. Fish and Wildlife Service to determine its status.

The Greensboro burrowing crayfish was discovered near Whittington Street in Greensboro in the late 1950s by Frank O. Perkins, then a University of Virginia student. It was subsequently forgotten until Dick Thomas, director of the Piedmont Environmental Center in High Point, rediscovered the species after initiating another search for the crayfish last year.

McGrath was aided in his survey by publicity generated from newspaper and magazine articles. "Over 200 people called or wrote in response when the *Greensboro News and Record* published an account of the rediscovery of the crayfish," McGrath explained. "Subsequently, papers and magazines through the Southeast printed that article, and people from as far away as Texas and Florida responded that they had Greensboro burrowing crayfish on their properties."

McGrath found the crayfish at many of the locations where people had reported it. "The many locations where I found Greensboro burrowing crayfish indicates it's not as rare as we once thought, although it apparently still has a relatively small range," McGrath explained. "The species appears to prefer wet clay soils for digging its burrows. In many places the habitats it prefers were disturbed areas such as backyards, underneath a deck, and, in one case, even in the middle of someone's garage."

Many of the roughly 35 crayfish species found in the state appear similar. However, differences in certain anatomical characteristics can be used to distinguish the various species. This year, McGrath plans to expand his survey of typical habitat to determine how widespread the species is. A final report on the findings is due to the Fish and Wildlife Service in 1994.

Blaze Orange Makes Woods Safer

Hunting Accidents Still Declining

Mandatory hunter education programs and the required wearing of blaze orange while hunting most game in North Carolina are credited with reducing hunting accidents to 32 for 1992-1993. This count is a reduction from the 42 accidents reported during the previous year in the N.C. Wildlife Resources Commission's Report of Hunting Accidents and Fatalities.

Five of 32 accidents during 1992-1993 resulted in fatalities, the same as in 1991-1992. The fatalities in the last two reporting periods are the lowest since the Commission began keeping hunting accident records in 1960-1961. By comparison, 19 fatalities were reported for 1964-1965, the highest on record.

It is significant that three of the five hunters killed in accidents during the 1992-1993 seasons were not wearing hunter orange. The report shows one of the fatal accidents involved a self-inflicted wound while each of the four remaining victims were killed by another hunter.

Hunter education programs began in North Carolina in 1973. Wearing of hunter orange became mandatory for big game hunters in 1987 and for small game hunters in October of 1992. For more information on blaze orange regulations, consult the *1993-1994 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest.*

—*Bodie McDowell*

Donations are Tax Deductible

Wildlife Watch Putting Clamp on Violators

A new reward program sponsored by the N.C. Sportsmen's Alliance is already getting wildlife violators out of the woods.

The Wildlife Watch reward program, which rewards informants who turn in violators for serious wildlife offences, was initiated last year as a cooperative project between the Sportsmen's Alliance and the N.C. Wildlife Resources Commission. By mid-summer, over 30 people had been apprehended as a result of the program, for a total of 42 wildlife violations. In one case, the tip led to the conviction of five poachers for illegal deer hunting at night with fines and court costs amounting to $2,400.

The Wildlife Commission's toll-free hotline number is printed on the logo. The program is directed primarily toward apprehending the gross offenders and illegal traffickers of North Carolina's wildlife resources.

The Wildlife Watch reward program is being funded by private, tax-deductible contributions to the Sportsmen's Alliance Foundation. The Sportsmen's Alliance is dedicated to the future of hunting in North Carolina. For more information on the program or the Alliance, contact the North Carolina Sportsmen's Alliance, P.O. Box 12604, Raleigh, N.C. 27605, or call (919) 781-4570.

The 1994 North Carolina Wildlife Calendar Is Here!

With such artwork *as Bob Dance's "Off the Banks" featured above, the North Carolina Wildlife Calendar is sure to sell out.*

The works of Robert C. Flowers, Jr., Dan Johnson, Ken Helser, Alan Cheek, Jake Taylor, Shannon Critcher Jones, Robert B. Dance, Bob Herr, Duane Raver, Mel Steele, James A. Brooks, and Dempsey Essick are featured in the 1994 Wildlife Calendar. Order yours today by returning the form below with your check or money order to 1994 Calendar, N.C. Wildlife Resources Commission, 512 N. Salisbury Street, Raleigh, N.C. 27604-1188.

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Book Review

B. W. Wells: Tar Heel Ecologist

Nature's Champion: B.W. Wells, Tar Heel Ecologist, *by James R. Troyer. Published by The University of North Carolina Press, 1993. 243 pages. $24.95.*

Concerns about the environment are so extensive in our society today that we forget how new the science really is. We are especially ignorant of the efforts of the first generation of ecologists who helped us understand the interconnections of the natural world.

One of the most remarkable of this generation was B. W. Wells, a professor of botany at N.C. State from 1919 to 1954 and author of arguably the most engaging and accessible book ever written about North Carolina's varied landscape, *The Natural Gardens of North Carolina*.

Biographer James R. Troyer's diligent efforts have filled in the gaps in the life and work of this remarkable scientist and teacher. Two themes—Wells as scientist and as teacher—form the heart of his biography of Wells, *Nature's Champion: B.W. Wells, Tar Heel Ecologist*. Wells came to N.C. State in 1919 and almost immediately began traveling across the state. He delighted in the natural communities that he discovered—longleaf pine forests, salt marshes, swamp forests, mountain balds—and he began to systematically study these plant communities. His articles in scientific journals contributed greatly to the new study of ecology.

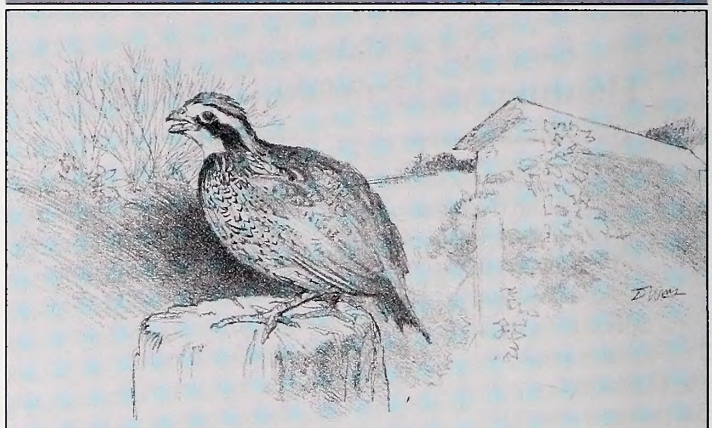
More than a "mere" scientist, however, Wells was a teacher who was committed to bringing this knowledge to the people. Author Troyer, himself a professor at N.C. State University, is not blind to Wells' weaknesses. He says that Wells could be unscientifically dogmatic on some topics. Yet overall, *Nature's Champion* is a sympathetic portrait of a pioneering botanist and a remarkable teacher.

Wildlife Endowment Fund Report

September 1993

Principal Balance
$18,780,762.00
Interest Earned
$12,365,087.61
Total Receipts
$31,145,849.61
Interest Used
$5,175,203.48
Fund Balance
$25,970,646.13

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.



Christmas for Wildlife

by Vic Venters

Come December 26, don't throw your Christmas tree away! Give it to wildlife instead. In return, you'll get a gift that keeps giving as you increase wildlife or fish populations.

One of the most common uses of old Christmas trees is to submerge them in small ponds. Many agricultural ponds—especially older ones—lack underwater cover needed to attract prey and predator fish. A sunken pod of Christmas trees will attract and concentrate fish for angling. It's best to submerge the trees completely in a pond and if you are primarily a bank angler, be sure to sink them within casting distance. Sink clumps of trees at scattered sites around the pond. The easiest method for sinking trees is to tie one or more cinder blocks to the trees with rope or wire. If you are dumping trees from a boat, be sure to wear a personal flotation device and exercise care when dropping trees over the side. Don't overload the boat; make several trips instead.

If you don't own or have access to a pond, don't despair. With their dense branches, brush piles made with Christmas trees provide good escape cover for small game, songbirds and other farm wildlife species. It's best to stack several trees to make a brush pile. Locate in areas that seem to lack natural escape cover.

If you live at a coastal area, you may want to donate your tree for sand dune renovation and restoration efforts. Rows of Christmas trees strategically placed on the beach will catch wind-blown sand and, eventually, form new dune lines. Check your local papers for tree drop-off points at beaches around the state.

Be sure to get your neighbors' trees, as well. If you don't have a trailer to haul them around in, you can substitute a boat and trailer. Simply tie the trees down securely and be careful not to exceed the weight limit of your trailer. Remove your outboard motor, if needed.

Merry Christmas.

N.C. Wild Store

Take advantage of these great items and you'll support conservation education throughout North Carolina. Proceeds from the sale of these publications will support the development and production of educational projects and programs.

"North Carolina WILD Places *will become a standard reference...The book combines accurate descriptions and illustrations in a way sure to attract both casual and serious readers. It really is a wonderful addition to the literature about the natural heritage of our state."*

—Fred Beyer, Past President, N.C. Science Teachers Association

North Carolina WILD Places Map Print

Charming, signed limited-edition art print showing North Carolina's wild places as seen by artist Jackie Pittman. 1,000 limited-edition and 100 artist's proof prints. Also available as a poster. 36" x 24".

Item code **E2-4**

Article Reprints from Wildlife in North Carolina Magazine

"The Spawning Runs." Informative article on the anadromous fish of North Carolina. Two-page map.

Item code **M4**

"Gardens for Butterflies." For the gardener who wants to attract some of nature's most colorful creatures. Species to plant, butterflies that will visit.

Item code **M5**

North Carolina WILD Places: A Closer Look

Easy-to-read text and Anne Marshall Runyon's delightful illustrations make wildlife habitats come alive in this 82-page book. Discusses 13 habitats across the state.

Item code **E1**

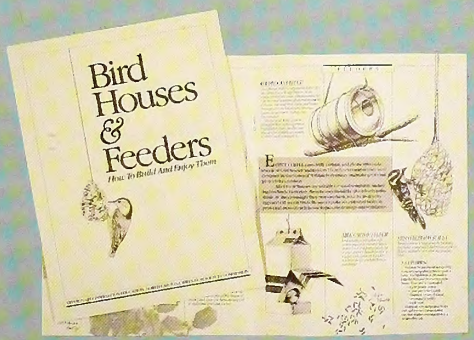
North Carolina WILD Places Posters

(Set of 3): Posters of "Old Field" and "Mountain Cove Forest" from *North Carolina WILD Places: A Closer Look*. Shipped folded with poster version of WILD Places Map.

Item code **E5**

WILD Places book and posters.

Item code **E6**



Birdhouses & Feeders: How to Build and Enjoy Them

An 8-page illustrative guide to building bird houses and feeders.

Item code **M6**

Lizards of North Carolina

Poster showing all of North Carolina's lizards. One of a series on the state's reptiles and amphibians. 22" x 34"

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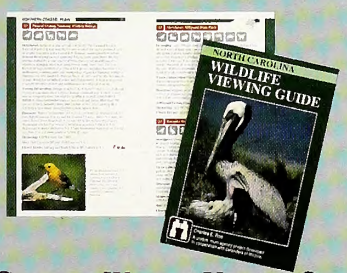


North Carolina Wildlife Viewing Guide

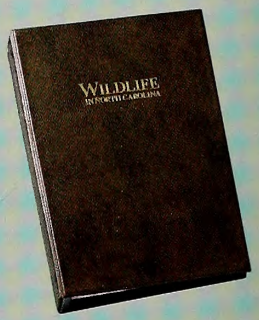
From Cape Hatteras to the Great Smokies, this color guide will lead you to 90 of the state's best wildlife viewing sites.

Item code **N6**

N.C. *Wild* Store

Wildlife in North Carolina Magazine

Excellent color photography and great articles on hunting, fishing, natural areas, wildlife research and our environment. See our easy-order subscription form on the next page.



Wildlife in North Carolina Magazine Binder

Store 12 issues in this sturdy binder.

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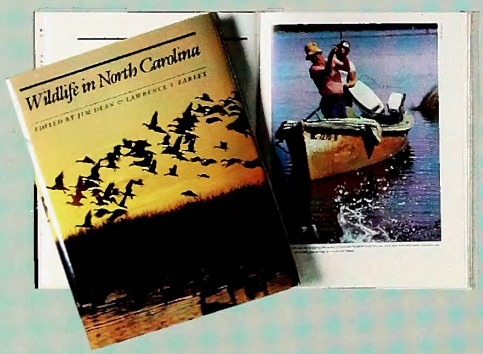

Wildlife in North Carolina Book

The best of *Wildlife in North Carolina* magazine.

Item code M3

N.C. WILD Art Print "Feelin' Lazy"

Sales of artist Robert Flowers' print will benefit Project WILD and other wildlife programs. 24" x 18".

Item code P1-P2

Wildlife Habitat Art Prints

Five colorful limited-edition prints depict wildlife in five habitats: mountain forest, coastal island, Sandhills longleaf pine forest, creek and beaver pond. 18" x 24".

Item code N1-N5

WILDlife Profiles Sets 1, 2, & 3

Each set features 10 animal fact sheets. W6 is a new arrival.

Item code W4-W6

All Things Are Connected (Video)

12-minute video uses the words of Chief Seattle to introduce environmental ethics.

Item code W1

This Land is Sacred (Teacher's Guide)

Classroom activities to accompany the Chief Seattle video.

Item code W2

All Things Are Connected & This Land is Sacred

Video and Teacher's Guide package.

Item code W3

To subscribe to Wildlife in North Carolina magazine, fill out the subscription form at right. To order any of the following materials, complete the educational materials order form (lower right).

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M2. Wildlife in North Carolina Binder. **$6.75.**
M3. Wildlife in North Carolina Book. **$12.**
M4. "The Spawning Runs" reprint. **$2.**
M5. "Gardens for Butterflies" reprint. **$2.**
M6. Bird Houses & Feeders: How to Build and Enjoy Them. **$2.**

E1. North Carolina WILD Places Book. **$10.**
North Carolina WILD Places Map:
E2. Artist's Proof. **$40.**
E3. Limited Edition. **$25.**
E4. Poster. **$6.**
E5. North Carolina WILD Places Posters (Set of 3). **$8.**
E6. North Carolina WILD Places Book and Posters. (E1 and E5) **$16.**

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N6. North Carolina Wildlife Viewing Guide. **$5.95.**

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P3. Lizards of North Carolina. **$6.**

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W6. WILDlife Profiles Set 3. Humpback whale, black duck, osprey, clapper rail, red-shouldered hawk, cottonmouth, diamond back terrapin, largemouth bass, black crappie, channel bass. **$2.**

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☐ Lifetime Comprehensive Fishing (residents only) (includes basic fish, trout and trout waters on game lands)	$250.00
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☐ Lifetime Sportsman Youth (age 1 through 11) (Application must be received before 12 years of age)	$350.00
☐ Personalized Lifetime Sportsman Youth (age 1 through 11)(Application must be received before 12 years of age)	$355.00

A copy of a certified birth certificate (or the mother's copy) must accompany applications for sportsman's licenses for infants and youths. Please note: Hospital copies will not be accepted. Also, birth certificates cannot be returned.

Pending satisfactory completion of the hunter safety course, persons who possess infant or youth licenses may exercise the privileges thereof when accompanied by an adult at least 21 years of age, who is properly licensed to hunt in North Carolina. "Accompanied" is defined as being able to take immediate control of the hunting device.

☐ Lifetime Sportsman (residents only) (age 12 or older) (includes basic hunt and fish, big game, game lands, primitive weapons, trout, N.C. waterfowl [Federal waterfowl stamp is mandatory and must be purchased separately.]).	$500.00
☐ Personalized Lifetime Sportsman (residents only) (age 12 or older)	$505.00
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On or after July 1, 1991, a person, regardless of age, may not procure a hunting license or hunt in North Carolina without producing a certificate of competency for completing the hunter safety course or a hunting license effective prior to July 1, 1991, or making out a written statement that he had such a license.

Check appropriate block and attach required copy

☐ Copy of Prior Year Hunting License ☐ Copy of Hunter Safety Certificate of Competence

☐ In lieu of copy, I am completing a written statement (complete below).

STATEMENT: I CERTIFY THAT I WAS A LICENSED HUNTER PRIOR TO JULY 1, 1991.

Date _____ Signature of Applicant _____

PLEASE TYPE OR PRINT LEGIBLY

Applicant Name: _____
(First) (Middle) (Last)

Address: _____
(Street/R.F.D.) (City) (State) (Zip)

Date of Birth: _____ (Month/Day/Year) Social Security No.: _____ Driver's License No.: _____

Male: ☐ Female: ☐ Telephone Number: _____ County: _____

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